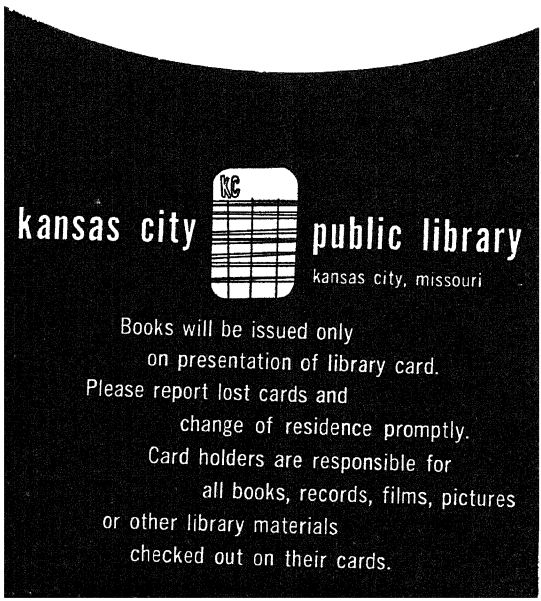

ORGAN DESIGN AND APPRAISAL

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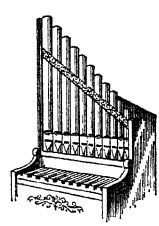
ORGAN DESIGN
AND
APPRAISAL

by

JAMES BLAINE JAMISON



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FOREWORD

JAMES BLAINE JAMISON loved the pipe organ, and this book, written in the last months of his life, is a testament to that love.

One could not talk with him very long before the conversation revealed his wide and deep interests. But somehow the discussion would always gravitate to his first love, the organ. It was stimulating indeed to hear him dwell upon it with such fervor, eloquence, and insight; and this book is the outgrowth of a comment I made during one such occasion to the effect that it seemed a pity that his great wealth of knowledge about the organ was not down on paper.

Mr. Jamison took this remark as a challenge, and the writing of this book absorbed almost all of his time and energy when he knew his life was approaching its close. Those of us who knew him best, and knew what this book meant to him, are grateful that it was given to him to see the final drafts of the manuscript; indeed, the suggesting of a few minor changes was among his last conscious acts.

Although this is technically a book about organ-building, it is also a book about organ-playing, for are not the two inseparably entwined? It is my belief that there is something of real value here for all of us who move in the orbit of this fascinating instrument, whether we be accomplished performers, students, builders, tuners, tinkerers, or just "organ buffs."

I also believe that it is a book which is much needed at this time, since the enthusiasts for the tonal conceptions of the Baroque, who have been responsible for so many of the fine current trends, are none the less so avid and vocal in their concentration upon the instrument of a particular day and the repertoire which was written for it that there is a real danger that the scope of the organ as an instrument may be unnecessarily narrowed and constricted in the years ahead. Mr. Jamison tried to see the whole picture, and his entire effort in later years was directed toward the designing of an instrument of moderate size on which one could play reasonably well all the repertoire, and do reasonably well all the things which our contemporary American religious practices require.

His voice is raised for this proposition here, and I think you will find it an eloquent and persuasive one. He speaks from conviction and knowledge, and he has the great gift of conveying in words the

texture and sensation of sound. He also speaks from first-hand experience, having travelled widely in his quest for knowledge, all the while listening voraciously, and exploring more organ-lofts than anyone else I ever knew. One cannot name a country where he was not familiar with all the great instruments, as well as many on the byways. The fact that he played only in an elementary fashion was probably all to the good, for it cleared his mind of preconceived tonal ideas, leaving him free to digest and evaluate what he heard.

Obviously, on such a controversial subject as organ-building, many will find things with which they do not agree; indeed, I took issue with him on a few points myself, and these differences made for very lively conversation indeed, for his red hair was a true reflection of the fires which burned within. But this book represents the mature conclusions of a man who spent his life thinking about and working with the organ, and I am sure you will find here much to stimulate your own thinking.

Mr. Jamison could be described as an organ designer and an organ builder, but I must also point out that he was an organ salesman, with the true salesman's devotion to the product which was his to espouse. Although he never put it in so many words, one always felt that he suspected competitors of using baling wire and chewing gum as the basis for their construction, and he was certain that there were at least the beginnings of horns under the scalps of competing salesmen! He sold cinema organs in those halcyon days when every movie theater aspired to house a "mighty organ costing $50,000!" Here his love of the instrument developed (is this not true of so many of us?) and it transferred easily to the true and classic form of which he writes here. His entire activity from that time on was directed toward the improving and refining of the instrument which he so dearly loved, and he played a major part in the revitalizing of two leading companies. The work in the first fell by the wayside, alas, and through no fault of his; but in the second it continues to flourish and make itself felt in the excellent work which that company does throughout the country.

I have brought up the matter of his being a salesman because inevitably, with his nature and his way of thinking, there were many passages in the manuscript which reflected his fierce preference for the work of the company which he represented, Austin Organs, Inc., of Hartford, Connecticut. It was the feeling of both Mr. Frederick B. Austin, the president of the company, and Mr. Richard Piper, its tonal director, that Jamison the salesman should not be allowed to interfere with

Jamison the organ theorist; and I am most grateful to these men for having spent many hours, with honest and commendable self-negation, deleting or re-writing passages which they considered the results of sales enthusiasm and instincts. We all felt that this was the wisest and kindest course. They have also made many suggestions which improve the technical accuracy of the text.

I must also speak of the untold hours spent by Mr. John Rodgers of The H. W. Gray Company in his work correcting the manuscript and the proofs, pulling together all the minutiae which necessarily are a part of such a book. Mr. Jamison himself heartily approved Mr. Rodgers' suggestions, and felt that the changes made for much clearer and easier reading. I think it remarkable that all this has been done without destroying the essential conversational tone of the text, for all of us concerned have been anxious to preserve the feeling that "Jim" is actually in the room talking to us. This feeling was a characteristic of the letters which streamed from his typewriter, and we were delighted that it seemed to carry over into the text of the book also, making for much more interesting reading in a book which, by its very nature, must be technical and detailed.

I have already taken too much of your time — much more interesting reading lies ahead. But I have tried to convey why it gives me great pleasure, as it would any of his friends, to present to you that true champion of the King of Instruments, James Blaine Jamison!

ROBERT BAKER

The Fifth Avenue Presbyterian Church,
New York, N. Y.
December, 1958.

There is a temptation to go into this matter of design — or the principles back of design — more elaborately, but shop talk, if it gets anywhere, is apt to be heavy at times; and brevity is not only courtesy but policy. The object is to get the reader interested in learning how to size up an organ, not to tire him.

But there is an immediate need for a book like this, which is not a compilation or review, but an adventure into the uncharted maze of harmonic laws that form the only real basis for organ design. Much of the so-called tonal planning of today is no more than itemized statements, lists of parts, stereotyped patterns, "specifications" of traditions and fetishes — a flat architectural drawing. We are not going to talk about anything like that.

Willa Cather wrote of the novel, "Whatever is felt upon the page without being specifically named there — that, one might say, is created." "It is the inexplicable presence of the thing not named, the emotional aura of the thing, that gives high quality." This intangible soul, in an organ, is made up of extremely tangible details — granite facts. We are going to look at some of them and identify them. But the way of the explorer is hard. As in advertising, he must state each principle three times. The first time "they" don't hear him; the second time "they" don't understand him. He asks their patience for the good of the cause and repeats himself yet again.

The science of organ design is the science of chorus subdivision, with meticulous nicety of detail, no matter how far the process is carried. Today the concept of the indispensable utility of secondary chorus work, balanced and harmonically integrated into contrasting and complementing sectional ensembles is almost unknown. The consequent raisin-in-a-pudding isola-

tion of minor voices testifies to this. The power ratios of Swell to Great, Choir to Swell, are as variable as the "designer" chooses to make them. The Swell, for years, has been the "darling" of some builders, the Great, even in their large organs, being little more than a manual to be coupled to — a stepchild division to which other sections must be added "to round out the ensemble." The art of planning a *multum in parvo* organ is less understood now than it was by some English builders of forty years ago.

There are builders who extend themselves on their large organs and neglect the small, and who apparently do not know which chorus to develop first. Others seem willing to accept almost any specification rather than fight to get it corrected, and so doom the organ to failure before a pipe is voiced. Then there are the eccentric professional-amateurs who omit unison diapasons from even a four-manual organ, and whose bizarre concoctions emit grotesque noises — yet are called organs. The country is dotted with such "orphans," and the unfortunate churches, betrayed in their trust, hold the bag. This inexcusable "tangent" stuff must be exposed.

Some of our nebulously florid advertisers, whose copy reveals a deeper grasp of human frailty than of scaling, continue to reap perennial harvests from perennial dupes. The cheap church organ, ignorantly conceived and commercially executed, is a sacrilegious cheat and a traducer of public taste, with no excuse for its existence except the ingenuousness of the buyer.

I have tried, therefore, to formulate even this sketchy system of appraisal whereby the worth, or worthlessness, of any organ can be established with reasonable accuracy, the church protected, and an essentially noble profession purged of ignoble work. Even to provoke controversy may help to bring this about. It is likely that all written here will not be accepted in some

quarters — that is to be expected. Youth usually chooses to learn the hard way, and traditional fallacies die hard.

A professional friend whose analysis I value highly has read my manuscript and written warning me against giving encouragement to amateur designers who today are the plague of the organ building profession, and who are responsible for the freak and experimental instruments. This is an unexpected reaction, and it has never been my intent to do anything of that sort. I am telling the way I think an organ should be conceived — and that's that. In all the history of organ building the leading names are those of dictators who brooked no interference and who, in their happiest achievements, were given *carte blanche.* The ambitious amateur is warned that his participation in the planning of an organ should be limited to modest suggestions, not rigid demands. If he persists in insisting on methods the builder condemns, let the amateur's name be placed on the console as "responsible," even though the term is purely academic; at least that would do justice to the builder. The builder's obligation — and you can depend on it that the top men regard it as sacred — is to get the best results possible from the money and space available. When he proves that he knows what is wanted, and the design has been agreed upon, let him alone; don't get in his way.

I am also told by my professional friend that my statements relative to remedial measures in unfavorable acoustic conditions are "too black and white." After a lifetime in organbuilding he says little can be done in the dead room where nothing coalesces and all voices stand apart. While one may encourage the fundamental by scaling and voicing treatment, this does not restore blend or bloom; the inherent grandeur and beauty remain impossible to achieve. It is a gloomy conclusion with which I do not totally agree; and if the organ enthusiast

wants to do his church, the builder, and everyone who in years to come hears the organ, a real service, let him work tooth and nail to influence the authorities to provide a reverberant building. That's half the battle. In that way he can help — and substantially.

Finally, when one has been identified for years with a firm known for its characteristic methods and ideals, it is probable that anything he writes will be presumed colored by that association. This is a book, not a tract. I write as an individual on a factual, not a partisan basis. I say what I believe — and what I choose. Some things have long needed to be said.

J. B. JAMISON
Los Gatos, California
April 27th, 1957.

TECHNICAL TERMS AND DATA

There are two general classes of organ pipes: flues and reeds. Sometimes these are referred to as labial and lingual, respectively.

A flue pipe is either open or stopped. It can be round, rectangular or triangular, of metal or of wood. It speaks by reason of the effect of a wind stream against (or near) its upper lip. Its speaking length is the distance between this upper lip and the top of the pipe. A stopped pipe is half as long as an open pipe of the same pitch.

A "stop" is a set of pipes, one for each note of the keyboard. An open pipe has its top end open to the atmosphere; a stopped pipe has a tight plug in its top.

An open stop is labeled 16′ when its lowest pipe (played from low C of the keyboard), measures about 16′ speaking length. An 8′ stop measures about 8′, a 4′ stop about 4′, etc. A stopped Bourdon speaks 8′ though its lowest pipe is but 4′ long, etc. A Nasard, or Twelfth CC pipe is about 2′ 8″ long and hence is labeled 2-2/3′. A rise of an octave in pitch halves the speaking length of a pipe. An open harmonic pipe is double the normal length and speaks the octave or second partial.

Suppose a pipe normally speaks at a pitch caused by 100 vibrations per second. A pipe speaking an octave higher will vibrate 200 times per second. If it speaks an octave higher still, it will vibrate 400 times per second. Every rise of an octave doubles the number of vibrations.

However, a pipe has within its speech multiples of its normal vibration speed. These multiples of the basic pitch are called harmonics. They are also called partials or overtones — all synonymous. Helmholtz, the great German physicist of the 19th century, enunciated the law that the quality of any sound (timbre) is dependent on the relative strengths of the partials it exhibits. If any one of the harmonics innate to a sound is

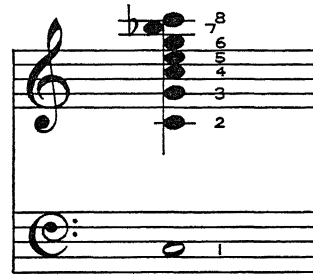
changed in strength, the composite sound will be changed accordingly. This law is a part of all tonal design.

The following are the harmonics generated by an open organ pipe:

Etc. Etc.

Harmonics or Overtones

8. Twenty-second
7. Flat Twenty-first
6. Nineteenth
5. Seventeenth
4. Fifteenth
3. Twelfth
2. Octave
1. Fundamental



The first of these harmonics, the octave, is known also as the second partial, or first upper partial.

A stopped organ pipe generates only the odd-numbered partials: Fundamental (1), Twelfth (3), Seventeenth (5), Flat Twenty-first (7), etc.

The various harmonics of the natural series practicable to use in organ work — not too high-pitched to produce from organ pipes — are listed below, together with their key names, common titles, mixture symbols, and *approximate* comparative vibration speeds.

				Ratio relationship:
1/4′	C.	Thirty-sixth	36	3200
1/3′	G.	Thirty-third	33	2400
1/2′	C.	Twenty-ninth	29	1600
2/3′	G.	Twenty-sixth	26	1200
1′	C.	Twenty-second	22	800
1-1/7′	B♭.	Septième (Flat Twenty-first)	21	700
1-1/3′	G.	Larigot (Nineteenth)	19	600
1-3/5′	E.	Tierce (Seventeenth)	17	500
2′	C.	Fifteenth	15	400
2-2/3′	G.	Twelfth	12	300
4′	C.	Octave	8	200
5-1/3′	G.	Quint	5	150
8′	C.	Unison	1	100
16′	C.	Double	sub	50

(Read up)

There is no such thing as a "sub-harmonic" in the natural series, but the Double or 16′ stop, is a common member of a chorus, and is included. The 5-1/3′ Quint is really the Twelfth of the Double and is not a harmonic of the Unison or 8′ stop. Various off-unisons above the 22nd that are not in common use today have been omitted.

The names are given these partials by starting with a unison C and counting white keys. Thus the Octave is the eighth white key, the Twelfth the twelfth, etc.

A harmonic pipe can be flue or reed, open or stopped. It is twice the speaking length of a corresponding normal pipe. It is voiced so as to speak its first harmonic, which raises its pitch an octave. Thus a harmonic pipe 2′ long will speak the normal pitch of an open pipe 1′ long. However, a stopped harmonic pipe will speak the twelfth, instead of the octave, for stopped pipes cannot speak the even-numbered harmonics. These harmonics of the sound wave are nullified by the node at the stopper. The odd ones dodge the stopper and are sounded.

A mutation is a stop tuned to the basic pitch of one of the odd-numbered harmonics. Thus the Nasard speaks the twelfth, the Tierce speaks the seventeenth, etc. One holds C but hears G or E, etc. Mutations are correctly made from fluty pipes, so when we refer to a Nasard we mean a flute—but the Twelfth is a member of the diapason chorus and is made from diapason timbre. (German Baroque work sometimes use flutes for Twelfths.)

A mixture is a compound stop made up of two or more ranks of pipes, each of which is tuned to some natural harmonic. Thus a 12th and a 15th would constitute a II-rank mixture, designated 12-15. A III-rank mixture could be 15-19-22. In Germany mixtures are indicated (in a "disposition"-specification) merely by their lowest pitch, as: Mixture III Rks. 2′. This probably means 15-19-22. Mixtures usually have three to five ranks, though they have been much larger — up to ten ranks

or more. Sometimes they have fewer ranks in the bass and more in the treble and are known as "progressive" mixtures. This is indicated Mixture III-V Rks., etc.

The composition of a mixture is its choice of harmonics throughout the keyboard compass. Thus: 15-19-22, 23 notes to A#; 12-15-19, 17 notes to D#; 8-12-15, 21 notes to C. The sound and effect of any mixture will depend on its composition and on the individual timbre and power of each rank of harmonics. It might be likened to a tonal recipe — put in a little more of this, or a little less of that — and get a different "flavor."

When a mixture is made up of nothing but unisons and fifths (C-G-C-G-C), etc., a solid, rich sound results — very different from that in which the 17th is used. The latter imparts a bell-tone — a jingle. The flat 21st is especially effective in the low octaves and Pedal mixtures, but is undesirable on the manuals above F, the 42nd note.

The C-G type of mixture is knows as a "quint mixture." It is often called a "Fourniture." If the G's (fifth-sounding ranks) are slightly softer than the unison ranks (C's), the tonal total reinforces diapason timbre most agreeably — merges into it, enlarges and enriches it. But if the G's are equal in power to the C's, the flavor changes to reedy or "trumpety" quality. The mixture then actually becomes a synthetic reed. Much more of this later.

A diapason chorus of normal size consists of 16′, 8′, 4′, 2-2/3′, 2′ and a mixture, which might well be 19-22-26-29. We should write out this chorus as follows: Sub-1-8-12-15-19-22-26-29.

It is accurate to state that upward and downward extension of the harmonic series increases grandeur of tone. When but one representative of each harmonic is present, the chorus is termed "vertical." If there are several members of unison pitch, this stratum is called a "horizontal" chorus.

A timbre is either well developed harmonically or the reverse, a complex or a simple sound. Accurate synonyms for the first condition are rich, bright, brilliant; for the second, fundamental, foundational, mellow, white.

SCALING. This concerns specifying the dimensions of a pipe or stop. In cylindrical pipes this means diameter. In rectangular pipes it means measurements of each side — preferably on the inside.

CUT-UP. This refers to the height of the mouth. It usually is given in terms of the mouth-width, *e.g.*, two-thirds cut-up.

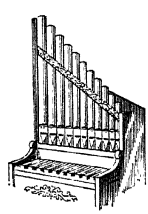
MOUTH-WIDTH. This is usually given in terms of the pipe's circumference. Thus, a "quarter" mouth measures one-fourth of the circumference, etc.

NICKING. This refers to cutting small teeth in the front edge of the languid and to a lesser extent in the rear edge of the lower lip. This nicking breaks up or diffuses the wind stream; deep nicking results in a "flutier" quality of tone and can do away with all transient attack noises which may or may not be an advantage.

WINDING. This means adjusting the amount of chest pressure air admitted through the pipe foot. It is done by enlarging or decreasing the foot-hole. It can also be done by adjusting the flue (windway).

PART I

TONAL CHARACTERISTICS



CHAPTER 1

A Few Generalities

AN ORGAN should fulfill two requirements—sound beautiful and be useful. Some fulfill one of these conditions, few both. The reason organists disagree as to what constitutes a good organ is not so much a difference in taste as an unfamiliarity with the laws governing ensemble, as worked out in the various national organ concepts. Edmund Burke said it two hundred years ago, " . . . what we call a difference of taste proceeds chiefly from a difference in respect of critical knowledge." As an approach to the planning of a comprehensive organ, let us consider some of the general or basic principles of design.

It has been said that the success or failure of an organ depends primarily on the specification, and secondly on the voicing of the stops. That is true — as far as it goes. For the stop-list is the strategy and the voicing the tactics of the campaign. Unless the main plan is sound, no excellence of detail can redeem it. If some vital link is left out, no amount of virtue in the rest of the chain can atone for its omission.

Many people think that all one has to do is to "draw the scheme." But this is going at things backwards. An organ is not a mere list of stops, an aggregation of individual tonal units, but a single highly integrated conception with a definite aim and purpose, in which every detail leads inevitably to an announced end. Wandering is weakness; redundancy, inefficiency.

The correct and illuminating point of view is to look at the stop-list as an analytical break-down. The stop-list does not make the organ — the organ makes the stop-list. The stop-list is

not a synthesis — the organ does not just "grow." The conception dictates the components; not the reverse.

Long ago the Rev. Noel A. Bonavia-Hunt told this chronically deaf organ world, "When you listen to an organ in a church you hear a duet between the organ and the church, in which the latter does not play *secondo*." This is so bitterly true that any approach to the planning of an organ that does not take into consideration the period of reverberation of the room in which it is to sound is as haphazard as blindly reaching to a store shelf for a garment and expecting it to fit.

For timbre is not absolute — far from it. The quality of any sound depends on the relative strengths of the partials comprising it. If the containing room favors some of these more than others, the timbre changes, sometimes a little, sometimes a great deal. Cup your hand about your mouth and speak. This is the quickest way to prove this law.

For realizing a conception efficiently as well as effectively, hybrid tone colors are inferior. There are five general classes of organ tone — diapason, gemshorn, flute, string and reed. If some of these structural voices are tainted with an admixture of others, their combining value is lessened, perhaps destroyed. The same applies to a chorus. A diapason chorus should be a diapason chorus — a reed chorus, a reed chorus. Always give the organist primary colors, so he can mix them and make his own tints. Don't give him tints to start with.

The most characteristic and majestic organ effects arise from contrasts of the two major elements — the diapason and the reed choruses. If the diapason chorus already has a reedy quality, obviously its contrast with a true reed group is weakened. Nothing could be more unsound, more fatal to organ beauty, than the hybridization of either of these flowers from which the tonal bouquet is arranged.

These facts are meant to be remembered. The laws of physics are inexorable. Disobedience is punished — instantly. No excuses avail. Unscientific planning foredooms the organ to failure, and in effect steals the money the church invests. Beware of the charlatan, especially the "honest" charlatan — the enthusiastic one. **No one has a right to plan unless he knows the rules — and obeys them.** No one, unless qualified has the right to experiment with other people's money.

So, after the conception, the next step in design is adaptation to the room. We must choose our chorus material to fit the degree of reverberation. In reverberation the various partials are reflected, and it is this reflection which constitutes the prolongation we call "reverberation." The long, slow waves of the low partials travel farther, get the benefit of more reflections — and reflections of reflections — than the shorter, weaker high partials, some of which never carry more than a few inches! All ensembles grow more fundamental with distance. The "lows" endure longer, too, which acoustic fact may bias our judgment of timbre. Thus the lightning-thunder (not the thunder-lightning) — the initial sharp crash, the prolonged low-pitched rumbling.

It is clear that the greater the harmonic content of any sound, the more it can be changed by acoustic influences. So we can look with reason for strings, trompettes, geigens, etc., to be greatly affected by their reflecting surroundings, and for flutes (which have far fewer harmonics) to "stay put" fairly well, no matter where located. However, we must say at once that reverberation puts a "bloom" on flute tone that continues on from where the voicer left off; its effect on richer timbres is even more marked. Reverberation glorifies all sound. We can go so far as to state that it is not merely difficult, it is impossible to realize-materialize an organ masterpiece in a dead room.

Here we digress, momentarily, to point the finger at those barbarians who peddle so-called "acoustic" materials that soak up sound and turn a good church into a tonal morgue. These perhaps well-intentioned (though I doubt it) ignoramuses deliberately engineer out of a church all the spiritual atmosphere reverberation has put into it. They give us rooms that will not float the vitality of speech, song or organ down the nave; they strip beauty from all sound; rob the spoken word of its charm and appeal; turn fresh young voices into faded wrecks, and so weaken the lower partials of every pipe, stop and chorus that the timbre turns "hard," which is a standard term for tone overbalanced by too-high partials.

We have mentioned pipe, stop, chorus. Each pipe is a little chorus; a group of balanced partials, low, middle, high. Each stop is a chorus, with its low, middle and high prime tones. Each chorus is a complex assembly of pipes and stops, and the law of reverberation holds for all!

In reverberation the low partials of every pipe, the low notes of every stop, the low members of every chorus, profit more from reflection than the "highs"; and the total tone is bent toward the fundamental — made more mellow. In reverberation the low partials of every pipe are relatively louder, the low notes of every stop abnormally bigger than their trebles, and the chorus double gains over the upperwork. Proof of how accenting the "lows" makes all tone, treble as well as bass, more fundamental, is afforded by the radio control button covering that function. Accenting the "highs," on the contrary, thins all tone.

Thus it is folly to lay down a fixed proportion in scaling a chorus. What will sound right in one room may sound unbalanced in another. This is also (and important to the organist) the reason why varying balance in registration is indicated for

various rooms (registration for acoustics), and it is unscientific to adhere to a rigid pattern predetermined for a given composition. The traveling concert organist can depend on this.

Builders: in a reverberant room, scale trebles proportionately larger and regulate them louder than basses, for Nature will favor the fundamental and build up the lows. Choose a brilliant structural timbre for flue and reed choruses, for the reverberation will mellow it by stressing low partials, notes and chorus members.

In a non-reverberant room, stress the basses and slight the trebles. Choose a less brilliant (more fundamental) basic timbre, for Nature will weaken basses (leaving trebles conspicuous) and will thin the general timbre by this same process.

In small rooms, regardless of whether they are reverberant or not, be cautious about using highly colored timbres — employ more foundational types of all classes of tone, for there will be no "distance" to refine them.

In large rooms daring colors and large scales are required, for here "distance" will make tolerable timbres that are actually unpleasant nearby. If the room is also dead, extra-large scales should be specified, with full, mellow, powerful tone throughout the gamut; otherwise the organ will sound puny, drab and thin. But never over-do. There are cases where the cure is worse than the disease.

Organists: in small rooms, avoid too bright, too high-pitched combinations. Be cautious with super couplers (on loud combinations especially). In dead rooms, either large or small, never omit unison diapasons and do not be afraid of chorus doubles. In large rooms, especially where they are reverberant, exaggerate the upperwork—it will not sound harsh or top-heavy.

Critics: when you encounter in a dead church a super-brilliant organ with thin structural timbres, lift the eyebrow at the

alleged "designer," and discredit him with exact knowledge of the craft. The same applies to overly-fundamental work in lively rooms.

Schnitger, at Steinkirchen, used white basic timbres linked with very prominent off-unisons in his flue choruses and achieved a cohesion and interesting substantiality of ensemble that would have been impossible with brighter structural voices and weaker artificial harmonics — all this in a very small, dead church. This is a very intriguing idea worth any amount of trial and study. It agrees with our premise that mellower timbres go better in non-reverberant rooms. The tendency in dead acoustics for all voices to stand apart and refuse to coalesce appears to have been ameliorated, at Steinkirchen, by this liberal use of harmonic "glue" in the off-unison ranks. Of course the infiltration of the flue-work with "reedy" harmonics, while it yields a cohesive full organ, destroys really efficient intersectional contrast. Take your choice.

CHAPTER 2

Chests and Valves (Attack and Speech)

AS AN ADDITIONAL PREFACE to satisfactory tonal design, and before we go any further, we must consider that the genesis of all organ tone is inseparable from the chest and its valves and the manner in which the pressure air is admitted to the pipe. Faulty principle here, regardless of fine workmanship and voicing skill, can wreck the best planned work to an extent where only the untrained ear that does not know what to *listen for* can excuse the derelict tone.

Let us examine what happens when a chest valve opens and pressure air is supplied to the pipe. Above the valve (inside the pipe foot) is atmospheric air (no "pressure"). The opening of the valve admits chest-pressure air into this atmospheric air, and eventually, depending on the speed of the valve's opening, the cubic capacity of the pipe foot (under the languid), the size of the opening in the pipe foot and the area of its exhausting flue or windway, the air under the languid reaches a stabilized pressure to which the pipe has been adjusted and at which it delivers its mature tone. It takes a 2′ diapason pipe something like one-twentieth of a second to build up to mature tone. The behavior of the chest valve is so little known and understood, and so utterly basic to success, that we are going to pause here and, for the first time in an organ book, explore the subject as far as science and the experienced voicer's findings have gone to date.

There are, today, three major types of chests, employing three radically different kinds of valve-opening mechanisms and

having three separate speeds of opening and closing. This matter of speed will be found to be of paramount importance.

We talk innocently and glibly of "fast action," "speed of response," and most of us, I believe, feel that an action should be as fast as possible — something comparable to a lens shutter that would "stop" a hummingbird's wings in mid-flight. But I wonder if more than a few of us know that an action can be *too* fast, and that the action many consider to be the best today is really the poorest in its fitness and adaptation to its job for this reason.

First, we have the old-time bar and slider chest in which the various notes C, C#, D, D#, etc., are each equipped with a chamber or "well" of air above a long, slim pallet valve running crosswise of the chest, and with "sliders" running lengthwise, which can be moved "on" and "off" so that the holes in them coincide (or not) with those in the chest top-board, on which the pipes stand. If there are, say, five stops on this chest and middle C key is held, the pallet for middle C "well" opens and all five middle C pipes speak if their sliders are in the "on" position.

This is a big, comparatively lethargic mechanism admitting chest wind into the chest well which is *above* the valve and *below* the pipe foot. Experienced judges measure the worth of the chest by the depth of the well. If shallow, it is less efficient. This large sandwich of atmospheric air acts as a cushion and turbulance absorber, but above all it insures that the chest wind will be supplied to the pipe *gradually*, without explosive shock (it takes time for the atmospheric air in the well to be brought up to the chest pressure). When we use the terms "lethargic" and "gradually" it is in a comparative sense. No one, to date, has complained of the speed of response of a barred chest with tracker action.

Any flue pipe can be blown by mouth, first gently and then with increasing pressure, to a volume far greater than that same pipe will produce on any chest, with correct and precise attack and speech.[1] Flue pipes object to being exploded into speech — *they demand to be eased into it.* The authentic bar and slider chest, with its huge, long-traveling pallet valve and its air cushion above the valve and below the pipe, supplies pressure air to the pipe the most gradually of any type of chest now in use. Not only that, but its time cycle of opening and closing is longer than that of any other chest; so that the valve actually stays open (even with a staccato tap of the key) *long enough* to deliver *enough* pressure air to the pipe to complete its build-up to mature speech. The huge pallet, of course, aids in this.

In the so-called "pitman" chest, each pipe has its individual valve, which is attached to a diaphragm pneumatic (purse or pouch). Valve and purse are suspended on a pouch-rail about a quarter of an inch below the bottom of the chest top-board, against which the valve seats, this distance being limited by the tiny "rise" of the pneumatic. Normally the valve is pressed up by pressure air against the topboard, being assisted in this by a spring. When the key controlling it is depressed, the purse exhausts and the valve drops. The entire assembly is very small, light, and low in inertia. It opens and closes with explosive instancy. It is the fastest operating valve in any chest.

It is probably an adverse factor that the rail is so close to the bottom of the topboard that the pressure air must squeeze through a slot (between rail and board) to get to the valve and climb over it into the pipe foot. Some firms using the pitman chest extend the pipe boring downward with a wooden nipple

1. There used to be a type of voicing machine with a lever which could be moved slowly, that controlled the chest pressure. It was possible to start a Pedal Bourdon pipe on low wind and swing the lever over until the pipe spoke on power at least three times its normal best, louder than a big Pedal Diapason.

or plastic tube, against which the valve seats, so as to increase this clearance and avoid the "congestion." Some also "scallop" the edges of the rail so as to shorten the distance the chest wind must travel to reach the valve. These expedients may or may not be as efficacious as claims made for them indicate, *but* they add up to a confession that all is not well, that there is a need for *more* wind with normal valve motion. Too many good firms, on both sides of the Atlantic, have experimented with these nostrums and spent too much real money on them to leave any doubt but that this "pitman" apparatus (in which, of course, the pitman plays no part) is inefficient and needs help. Greater movement of the valve would probably cure the trouble, but with this type of purse design it is not possible.

The ventil type of chest is little used in this country and differs, basically, so little from the pitman chest in its individual pipe valves, actuated by individual pneumatics, that we shall not discuss it. The unit chest magnetic action valve also shares in this classification.

The so-called "universal" chest, however, presents an entirely different kind of valve control and a valve that hinges and swings down at an angle instead of being "square-acting" (vertical in its motion). In this chest a large square pneumatic attached to an inside chest wall, and exhausting through that wall into atmosphere, moves a rod (trace) that extends horizontally across the chest and opens the valves of that note by means of short levers — if the stops are "on." The short and efficient exhaust, and large pneumatic with greater movement than the small purse of the pitman chest, result in a valve's staying open longer and delivering a *greater* volume of pressure air with a key tap than does the pitman chest apparatus. The opening and closing of the weightier universal valve mechanism is naturally more gradual.

A practical and convincing comparison of the amounts of air admitted by a staccato tap of the key on the three types of chests can easily be made. Simply hold the hand over the pipe hole and tap the key. The barred chest will emit a very obviously large amount of air with the fastest tap. The pitman chest, on the same note, emits a bare puff. The universal chest fits in between the two, with less than the barred and more than the pitman.

This key tap is the voicer's standard method of testing the speech of any flue pipe. By observing how the pipe reacts to a "tap" flush of wind he determines if the various parts affecting speech are properly adjusted; in shop parlance, if the pipe is "slow" or "quick." If it gurgles (the "bubble") without any definite harmonic speaking, it is "slow."

But there is a dimension or latitude to timbre, just as there is to pitch. We tune in octaves and check the exact middle of unison by testing with fourths and fifths. In voicing we adjust the upper lip, flue, languid, toe, etc. of the pipe so that when blown by mouth it will (a) speak the "bubble" *and* the octave, (b) the "bubble" *without* the octave, or (c) the "bubble" and, *with great pressure,* the octave. All three results of these placements of the voice of the pipe are within the dimension of good tone.

Many years ago Arthur Harrison, the great English builder, told me (and he personally voiced or checked every flue pipe that went into his organs): "When voicing and regulating a pipe you reach an optimum point where the pipe delivers its utmost in power and brilliance. If you go past that point, you force the tone and spoil it; but if, on the contrary, you fail to reach it, you will never get the full potentiality of power and *beauty* the pipe possesses." This might be considered the prime factor in organ work. It is the basis of all good work. Its neg-

lect or ignoring is the basis of poor work. No matter who neglects or ignores it, or for what reason, that individual or firm kills all chances for top quality. Notice, as we proceed, how the really great builders used it as the foundation for their greatness. Of course, the ideal chest-valve should lend its every effort to this optimum and develop full maturity of harmonic content coupled with prompt, *precise* speech. And, of course, any chest-valve that does not, automatically disqualifies itself.

Electronic diagrams of the build-up of a diapason pipe's speech show that if there is the least tendency to "quickness," a too-fast valve action develops the octave before the fundamental. The more gradual the chest wind attack, the less this tendency is exploited. The more sudden the chest attack, the more this preliminary octave (defective speech) will be heard. So it becomes clear that a pipe must be voiced differently in order to do its best on different chests, which vary so greatly in the time of their opening-closing of valves, and in the amount of pressure air they admit with a key tap.

The diapason pipe, to be properly adjusted to the barred chest must blow (by mouth) its "bubble" *and* the octave.[1] The supply of pressure air is relatively so gradual (yet copious) that the tendency to blow over to the octave, inherent in a pipe so voiced, is not exploited, and the pipe gives a prompt, mature note of maximum power and harmonic development. (The two qualities go hand in hand.) Transfer this pipe, so voiced, to a normal pitman chest (same boring and pressure), and it will at once blow over to the octave and may take a noticeable time to settle on its prime. This is the well-known "gulp." It must have its languid raised and/or its upper lip pushed in to an extent that,

1. The speed or ease with which a pipe blows the octave and bubble will depend upon the wind pressure on which the pipe is voiced, or to be voiced. This applies to all remarks concerning the blowing of pipes by mouth.

by mouth, it will blow the "bubble" but *not* the octave. The pipe is now "slow"; yet the percussive pitman chest attack will tend to make it "quick," in spite of the slow setting, and cause it to speak a preliminary octave. *Though the pipe is slow, the chest will make it quick!* This pipe, which with gradual increase of pressure of mouth blowing will refuse to do more than gurgle, is jolted into the octave by the fast chest attack. So it must be "slowed" — bent over backward in order to stand vertical, so to speak.

Now place this same "slow" pipe on a universal chest, and it will have to be *quickened* (languid lower, upper lip out) in order to yield a prompt, precise attack and speech — not as much as for the barred chest, but so that it will, with heavy mouth pressure, speak the octave as well as the "bubble."

It is well known to voicers and finishers that quickening a pipe without increasing the foot opening loudens it, and that slowing softens it; also, that one way to avoid the preliminary octave is to take wind off at the foot. So it is theoretically and actually impossible to get as much power out of a pipe that is slow as it is from that same pipe voiced slightly quick; but, also one dares not quicken the pipe if the chest blows it over! Power and harmonic development are partners, increasing in parallel fashion. Therefore the pipe voiced on the barred chest is the quickest and delivers greatest power and harmonic development without "blowing over," and with prompt attack.

The universal chest, with a pipe almost as quick, delivers almost as much power and harmonic content without "blowing over" (precise speech attack). But any chest with too fast and abrupt a valve opening demands that the pipe be softened at the foot, and this, of course, takes away harmonic development as it decreases the power. Not only does this lesser wind supply avoid the preliminary octave, but it prevents the pipe from

reaching its optimum point of power and beauty. In other words, the individual pneumatic-valve-to-a-pipe mechanism, with its low inertia and sudden attack, stands in the way of maximum richness and power, and is the least satisfactory of the three chest types for good speech and tone.

The remedy for all this that first comes to mind is the "expansion chamber," a sort of box placed on the chest, above the pipe hole, providing to a certain degree the cushion effect of the "well" of the barred chest. The pipe then stands in a hole on top of the box with a quantity of atmospheric air below it and above the valve, as in the barred chest. The other expedients, such as scalloped rails, extended borings, etc., are of doubtful value. Even so, with an expansion box over an individual pneumatic valve, the valve works so fast and closes so rapidly that the supply of chest wind delivered is inadequate. Larger valves are indicated, if there is room for them.

The individual valve (pitman or ventil or unit) chest voicer is faced with a problem: either he can soften the pipe after he has slowed it and be content with somewhat less than the ideal potential within the pipe, or he can give it a bit more wind at the foot and get more harmonic development, and also the preliminary "octave-gulp." A proper attack-speech is of course "one" (maturity reached so instantly that the ear accepts it as such). The "gulp" may also be caused by the ultra-fast closing of the light pitman chest valve. In the confined space between rail and topboard, the area of the pouch-valve is greater than that of the pipe boring, and a final compression could be delivered by the valve's closing slap.

Weighing the three types of chests for all-round merit, or demerit, the barred chest yields the best attack-speech, but has so many inherent defects in other respects that it can never have more than a few supporters in this country. There is often a

noticeable "gasp" in full chord attacks, unwanted humming of notes (a "run") within a tight chord, impossibility of doing a really fine tuning job; for after the tuning stop is set and others are tuned to it, the addition of the other stops may cause "robbing" and flatting. Reduction of pressure may cure humming leaks, but it has no effect whatever on "robbing"; pipes will rob just as noticeably on low wind as on high. Sliders tend to stick in damp weather and to leak in dry, though these difficulties can be pretty well overcome. Substitutes for the long slender pallet have been devised, but they do not admit the amount of air the long one does, and modern chests of this sort are notoriously shallow, weakening the intended effect of the deep well.

Because it dodges or minimizes the defects of principle of design native to the other two types, the universal chest emerges from the comparison "first" in any summary of speech-tone and avoidance of robbing, wobbly tuning, etc. It is an excellent compromise between the barred and pitman chests in its gradualness of attack, it delivers an adequate supply of chest wind for staccato-mature speech, and it permits first class harmonic development without "blowing over."

The conclusions reached here are not casual. They are the result of long and intricate discussion of the basic facts with voicers in America and Europe, thoroughly experienced over the years with voicing on all three types. These talks have been bolstered by consultation with a leading physicist who has conducted many experiments and done much research along just these lines of chest-valve-speech. I was amused by his reply to my question, "What about this German who wrote a book on this very subject?" He replied, haltingly, "Well, he wrote it in German, and he quoted another German, and it was concerned with just one experiment, whereas science would never accept anything less than coordinated results from many experiments.

Science confesses that it still knows nothing solid or certain about what happens when a flue pipe speaks. It has to accept the word of the voicer for what he knows does happen, but as yet it cannot supply the reason why. I have been forced to abandon the vortices theory of tone and go back — partially — to the air-wave theory of Herman Smith. If it were a matter of life and death, as radar was during the war, it would probably be solved in a matter of months. But the incentive is too slight, the expense too great, and so the work has not yet been done."

But, although the pitman chest individual pneumatic valve is unfavorable to good flue pipe tone, what about reeds? It would seem that the more sudden and explosive the air jolt, the more readily would the reed start vibrating. But this, too, is a delusion. The voicer tests the reed for prompt speech by the same staccato tap of the key of his voicing machine. Not enough volume of wind is admitted by a tap of this valve to start the tongue vibrating at the proper pitch or speed — an argument for short "boots." Some vibration of the tongue will take place, but not in sufficient strength (amplitude) to cut off the wind from the shallot opening with each vibration. What takes place is inaudible. A flue pipe that is not speaking correctly, whether quick or slow, will usually give some kind of immature "spit," but with a reed it is generally true that when speech is not correct, the reed will give no response when the key is tapped. It is either a full tone or silence.

Everyone knows the importance of having the reeds speak instantly, but to get this promptness over a pitman chest valve (from a tongue that was right for a barred chest) *the curve must be reduced,* so that less wind is sufficient. It is no surprise, therefore, to find that most individual valve chest builders have come to the French type parallel shallot with its wide openings and "straight" tongued reeds.

The lower the pressure on which flue and reed pipes are voiced, the less jolting is the initial blast of chest wind admitted by the valve. The longer the flue pipe foot, the better is the jolt absorbed. It is also true that narrow pipe mouths aid precision of speech, probably by shortening the time it takes the impulse of pressure wind to spread clear across the mouth width. The subject has innumerable side streets down which it is a temptation to wander, though it would be somewhat pointless here.

I should like to quote part of a letter from a trusted consultant whose lifetime of voicing experience makes him an authority. He writes:

"The chief factor in good and bad flue tone is the position of the languid — not just if the pipe is 'quick' or 'slow.' This languid must be right and it must not be too low. Now if a pipe is so made, or the voicer gets the top lip too far back, he will have to lower the languid to get reasonable speech. It will not matter if he voices the pipe on the slow side; the tone will still be poor unless he corrects the position of the top lip and the languid.

"Another way this bad or 'white' tone can come about is by the lower lip's having a tendency to curve outward — and this can easily happen with a flat lower lip. If the pipe is made with a too narrow flue, or if the voicer closes the flue and then opens it again, the lip will tend to curve out; and even if the top lip is well forward to make the pipe speak, the languid will have to be very low. No matter how slow the pipe is voiced, the result will be poor tone. All these things can happen in manufacturing and are a constant headache to people like me. You know I have always liked the 'dubbed' lip because it allows the pipe to be voiced with the languid higher. I think that when you have heard good tone, the tone you liked has been slow,

prompt, yet leisurely. (He means by this that the pipe will not blow over to its octave by mouth except with great pressure; yet on the chest it speaks reasonably promptly.) On the other hand, when you hear tone which you call 'white,' the pipes have been voiced 'slow' (blown by mouth), but the chest is having its effect and making them appear 'quick' (white); for as I have pointed out, there is more than one factor in this matter of good and bad tone."

Here you have an intimate over-the-shoulder look at the troubles of a voicer; and from it you derive the fact that some chests are harder to handle than others — especially when they prevent the voicer from really developing the harmonic content of a pipe by their tendency to blow it over to its octave.

Another item of current importance is that an unnicked pipe is definitely not happy on a pitman type chest. If a pipe "chiffs" excessively, we nick it to reduce the chiff. If the chest-wind attack is explosive, this nicking will have to be extra deep — which is not desirable.

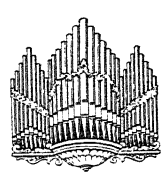
Low wind, of course, minimizes all defects of voicing no matter what causes them; it is the refuge for the user of a chest of faulty principle. But no matter how low the wind or how fine the work, this inferior principle is always just beneath the surface; and if the quality of the work relaxes, at once there develop audible faults. These will be most evident in endeavors to achieve capacity pipe output.

The amount and weight of all this evidence smells of "arrangement," and I know I shall be accused of partisanship. But what quicker way to lose reader support than to inject bias? I have merely laid the facts in as straight a line as I know how. They will speak for themselves. I have not said that good work cannot be done over the pitman valve, for that would not be

true — or just. Plenty of fine work has used it. But I do say that results have been in spite of the chest and not because of it, and the same skill and effort applied to a device more favorable to the production of optimum tone would have yielded even better work.

We can see that the wrong chest means a false start on the road to the right organ. The chest must be right before another step can be taken.

Recently, while I was discussing this influence of the individual pneumatic-valve chest on flue pipe speech with an old voicer-friend, he volunteered the following: "The other day I was trying out a large organ of celebrated make I had just contracted to service, and noticed how fluty the diapason work grew toward the treble. I could not understand why voicers for that firm would leave the pipes like that. I went up into the organ and blew them by mouth, expecting them to blow over to the octave with no effort at all — but no — I blew, and blew, and blew — and they wouldn't go over. The pipes were really slow, yet the chest had made them quick. I should not have believed it possible, but it was true."



CHAPTER 3

The Choice of Chorus Timbre

THIS NEXT STEP is the desirability, the vital necessity, of using primary colors both in organ stops and in organ choruses. Often we get the stops but not nearly as often the choruses. It is of the essence to analyze first the delicately balanced and flavored diapason chorus, for it is the heart of the organ, the core of the conception, the *sine qua non* of a real organ, without a counterpart in any other musical instrument. It is the major effect on which the ensemble rests.

The diapason occupies a space, not just a point, in the tonal spectrum about halfway between flute and string, midway between harmonic poverty and riches. The diapason chorus usually consists of the 8′ unison, 4′ octave, 2-2/3′ twelfth, 2′ fifteenth, 16′ double, and mixture work of unison and fifth sounding ranks extending up to the 22nd, 26th, 29th, or higher. This upward extension in ranks or pipes tuned to the basic pitches of natural harmonics is a matter of considerable freedom of choice. The limits are flexible, but the chain of harmonics (unison and quint) should be unbroken within the limits chosen. There are all sorts of acceptable chorus formulae, depending on the harmonics employed, their keyboard gamut (composition), their power and vividness. But in general, the designer must remember that too foundational timbres will not cohere, and too brilliant tone will lack mass; and the flavor of the entire ensemble of diapason harmonics will hang on the relative conspicuousness — in pitch, timbre and power — of the individual ingredients.

Speaking broadly, domination of unison sounding ranks induces a "silvery" or true diapason quality. If the fifths dominate — or even equal the unisons — the chorus turns reedy or brassy. The builder and organist can make the choice; they can, if they like, prefer and specify the diapason chorus brought about by the "fifthy" mixture, which is actually not a mixture at all, but a *synthetic reed.*

But what the builder or organist prefers is beside the point — an almost totally unrecognized fact. There are penalties attached to this choice about which the chooser can do nothing. For from the standpoint of efficiency (greater color variety, individuality, in contrast and in blend, from a fixed number of ranks), the fifth dominated mixture runs a very poor second to that dominated by the unison. The reason for this stares one in the face. If we should call diapason "blue" and reed "yellow," we could mix them and get "green." Now we should have blue, yellow and green — three colors. But if our "blue" already has "yellow" in it — it is hardly necessary to go through with the simile.

If our diapason chorus is decidedly flavored with fifth sounding partials (which are characteristic of reed timbre) to the extent that there is more than a suggestion of trompette tone being drawn with it (and this is by no means an unusual state of affairs today), then we have not a diapason chorus at all, but a hybrid melange whose diapason integrity has been destroyed. Its destruction has deprived the organist (and listener) not only of his finest characteristic effect, but has narrowed his chances for combinational variety and contrast substantially.

A quick way to find out how the mixture unisons and fifths are balanced is to hold the lowest note of the Mixture, comprised say of 12-15-19-22, or 19-22-26-29. Then hold the same pitched pipes on the Octave or Fifteenth. Of course the C's and G's on

either of these registers will be of the same power. Usually the power of the Fifteenth will be close enough to that of the Mixture to afford a reliable comparison. If the sound of the Fifteenth chord and that of the low CC of the Mixture is similar, then we know that the Mixture C's and G's are also of the same strength. Such a Mixture always — not *nearly* always — *always* exerts a "reedy" influence. The pity of it is that some builders believe this is the correct way to scale and balance a mixture. A great many organists who play organs with such synthetic reeds do not even know how a real mixture ought to sound! I hope the day is not too distant when the public will awaken to the fact that chests of faulty principle can impose voicing methods that carry the germ of fatality, and to the equally important fact that reedy mixtures fit into the concept of design that voluntarily does without flue-reed chorus contrasts, contenting itself with one general flue-reed tone it calls "ensemble." Compared with the blue-yellow-green plan, this is second rate thinking.

For some years I have been preaching this doctrine, and at last it is beginning to be heeded. New work shows "unison" mixtures where old work was all "fifthy." Every authority admits the value of powerful sesquialteras and other "reedy" mixtures as an adjunct to the unison-dominated true diapason chorus — but the genuine article should always come first. It is not necessary to pervert diapason chorus timbre from the beginning. One mistake leads to another; seeking contrast with the "reedy" flue-work, builders have created Swell reeds which are exaggerated trompettes of the fiercest timbre and of power sufficient to tell against the reed-flues. Away goes the Great-Swell perspective (Swell too loud). The design goes down the garden path, and efficiency goes out the window. One can see

that the basic idea can make or break the product. It can make the most of every resource, or it can condemn, from inception, the entire investment to inhibited application and scope. It brings to mind the old adage, "Be sure you're right, then go ahead."

In summation: design is concerned with a definite concept, fitted to acoustics and obeying fixed laws of blend and contrast.

CHAPTER 4

Tonal Characteristics as They Developed in Various Countries

"DEFINITE CONCEPT" can be a disconcertingly indefinite term. The English cathedral organ is a very definite concept developed about the accompaniment of the English church service. The French school of organ design is an equally definite and very different concept, fitted to the freedom of the Roman Catholic musical service and encouraging service improvisation and solo use. (I recall a noon mass at the Church of the Madeleine which was advertised on placards outside the church as a "Mass-Recital," with the Franck E-major Chorale interpolated throughout the service!)

The seventeenth-century Germanic school aimed at efficient and easy performance of polyphony. Early as well as modern German and French organs can be compared, in their relation to the music of their periods, to the old query of which came first, the chicken or the egg. The probability is that the organ dictated the type of composition, which varied later as the organ was developed. It is likely that the difficulty of adequate wind supply produced the pattern of the parallel shallot for chorus reeds, which make a lot of noise with very little pressure. Pressures were kept low, not just for "artistic" reasons, but because pumping machinery and bellows were inefficient and crude.

The Schnitger and Silbermann concepts (radically different) represent North and South Germany — if such an indeterminate classification can be used. The Schnitger and Danish organs of the seventeenth century (as well as much Dutch and

Danish work of today) were based on an ensemble principle "harsher" than the Silbermann type in the South (including Alsace) which developed around the celebrated Silbermann Diapason — one of the most beautiful and noble sounds an organ can yield, and more foundational than "Northern" sounds. It may seem a whimsical fancy, but it works out in practice, that the general "personal" character of a locality finds reflection in the basic timbre of its musical instruments. This is true of organs, and of pianos, even to small city localities. The English Trumpet and the French Trompette are highly developed expressions of national character. The brilliant French Pleyel piano (which blends so well with stringed instruments) and the solid Broadwood illustrate the principle. The Thuringian-Alsatian influence showed in the Silbermann work; the Prussian-Danish, in Schnitger and other organs of the type.

The feud between English proponents of bright and fundamental chorus tone used to be so bitter that a visitor might well have gathered from the violence of partisan expression that the "other" firm was no better than an incompetent vandal. Yet good work of both kinds was current then — and is now — though it is but just to say that the fundamental style is on the wane.

So, to start afresh, there is no point in the student's being so opinionated or so wrapped up in the work of one firm as to fight that of any other. The time may very likely come, as it usually has, when his favorite is discredited by the turn of tonal fashion's wheel. Judgment founded on less than basic premises is the mark of the amateur. Those familiar with fine examples of the various national schools of design find tolerance easy and narrowness difficult, for they know from first-hand hearing that good work, and very different work, exists in every country. But when a pattern, no matter whether national or local, fights

the laws of physics — that is another matter. When primal faults of tone combination taint the product and prohibit efficiency, then that work is fair game for the critic who can point out those faults. Call a spade a spade. The good of the church-public comes before that of any builder.

There was a period not too long ago when the American theory of design was occupied with the "international ensemble." One heard the term on every hand. The first steps in gathering under one stop-list the best features of American, English, and Continental tone were just that and nothing more. We believed there was nothing like a top-drawer English diapason chorus; nothing like French trompettes for drama; nothing to equal certain flutes, mutations, etc., and nothing to approach a Father Willis full Swell, that most original of English contributions to the organ, without a parallel even today. We dealt in separate, national effects.

Looking back over my own forty-odd years in the organ business, I cannot understand why it has taken me so long to get past that elementary stage — that patchwork of tone. And yet I comfort myself with the thought that I had plenty of good company; in taking the next step I have little or none. That step is, obviously, the *amalgamation of various principles*, not just stops or choruses. Certainly it is not the stressing of any one foreign system of design, not a resurrection of the dead past. Just as certainly it is not tying a classic tail to a romantic kite.[1] The object is to *capture the intent* of the contributing components —not to copy their details. For just as national concepts of organs

1. This sort of thing brings to mind the Karlskirsche in Vienna, an explosion of Baroque exuberance that took place in 1717, in which a genuine Greek temple front, complete with Corinthian capitaled columns and sculptured Parthenon pediment, is stuck against a "Venetian Baroque" domed and towered building — the whole dish of architectural hash being flanked by two huge minarets adorned with spiral Roman bas-reliefs and topped with cupolas any muezzin would call home!

brought about national types of composition, so those essential organ stratagies, proven by centuries of test, must be worked into the ideal composite organ that will authentically play the literatures they have created. Catch the spirit without the letter! It will be all the more creditable if we can achieve the same end with a fresh method, but before we break the rules we must know them.

It is therefore necessary to find out the main object of each manner of planning an organ. What was the French conception intended to do? Was it a solo or an accompanimental instrument? Where did it originate — in small churches or in cathedrals? Were its tones designed to fill vast edifices and to be refined by distance? Will this French concept sound musically right when transplanted to another, smaller environment? How much of it should we incorporate into a composite, less specialized organ?

What about the Schnitger and Silbermann systems? What were their main objectives? What kind of music were they intended to play? How much of that music finds a just place in modern church and concert work? Was this German Baroque organ good for accompanying congregational singing? Did it grow out of that need? What especially adapted it to handling polyphonic music? What were its weaknesses?

What about the Dutch organs? What can the English give us? What is the English system, if there is one? What has America added? Is it fitting that we, the composite nation, should originate the composite organ? Let us look at the several national types.

CHAPTER 5

The Schnitger and Silbermann Organs
(North and South Germany)

PEOPLE writing about what they heard in Schnitger and Silbermann organs speak of a magical quality that would lead the reader to believe that they are entirely different from any other organs ever made. But the truth is that each builder did no more than follow religiously the exact pattern of harmonic series necessary to cohesive ensemble — being not at all original or different in this. What originality each imparted to his work lay in the treatment of the voices within this frame. Each knew what *not* to do. Each knew the rules of physics — and obeyed them meticulously. There is nothing unique or bizarre about these great organs — no secret, no magic.

In a word, Schnitger dispositions showed elaborate harmonics added to fairly simple diapason and flute unisons — no strings. He thoroughly knew that nothing adds up in power like pitch differences. Horizontal chorus-work figures very little in his schemes. Consequently, he got what sounds like impressive volume from a deceptively few number of registers. Modern listeners continually exclaim over the surprising power of Schnitger work. If they thought twice, they would see where it comes from. Nothing is lost in combination. Every stop *tells* when added. Pitch difference does it.

Up to the middle of the eighteenth century flue pipes were given few, if any, nicks, and those few were light. Wind pressures were under three inches (76 mm.) At 50 millimeters no nicks are needed; at 65 mm. they begin to be necessary, and at

80 mm. they are indispensable. The lighter the wind, the easier the tracker action touch, the less the difficulty with blowing apparatus, and the less the need for nicking — so pressures were kept low — too many good reasons for doing so! But of course there was and always will be trouble with reeds on such low wind.

The chorus flue-work was nevertheless blown close to capacity, with all regulation at the flue and with the pipe feet open to the full. This way of doing things means real difficulty in regulating for even timbre and power. Today we regulate at the foot and leave the mouth alone; then, and even today with the "neo-Baroque" builders, a change in power means a change in timbre unless the expert adjusts the lips and languid to compensate. The lower the pressure, the less work this involves, for low wind minimizes all defects of voicing. But we must not get the idea that the old work was "gentle" in its tone. On the contrary, the authentic Schnitger work and modern imitations of it are pretty well "all-out" in their winding, and the timbre of "modern" Schnitger mixtures (individual pipes comprising them) is, on the whole, brighter and louder than what American and English ears are used to.

Some, but not all, of the old work also featured voicing treatment that yielded a tiny transient noise coincident with attack-speech. This is really a speech defect due to a slight edge tone, and sounds something like a "tuh" as the pipe speaks. It has, when not overdone, a certain charm, and it undoubtedly aids clarity by stressing the entrance of every note in polyphony. It spells attack with a capital "A." It tends to separate each note from the preceding and following one. Nathan Milstein used to get the same effect from the violin — runs that were strings of pearls with the thread showing between each one — perfectly beautiful! But the Baroque masters used this with discretion; it has been exaggerated by some modern builders.

The Schnitger system of ensemble was largely synthetic. I mean by that that the vivid colorings came from mutation harmonics more than from harmonics within the pipes. These artificial coloring agents were supplied in abundance and variety, either separately or in compound stops — and they were bold. The fifths of the mixtures were just as loud as the unisons (we must remember that during that period there were no true chorus reeds, in the Victorian sense, which could dominate a section and contrast with flues). A Sesquialtera might be the same scale as the Great Diapason, a terrific affair in full organ. The modern German builder, Hans Steinmayer, in a Canadian installation, supplied a Scharf with the composition 22-24-26-29 in which the 24th (E) was louder than the 29th (C). The thing howled like a big reed. Mr. Steinmayer was copying, not originating. Such synthetic reeds took the place of real reeds, which in general tended to be thin pigments.

The Schnitger organ in Steinkirchen, near Hamburg, and nearer Schnitger's home, is a classic example. The church is very small and very dead. The synthetic off-unisons are tremendous. The basic structural registers are "white." Were they rich, they would sound thin. But cemented together by the bold mutation ranks, they constitute a solid tonal mass — and in this one fact Steinkirchen seems to me to afford the most striking lesson of the past. One cannot believe it till he hears it. A great mind, moving freely, which discovered and proved what modern builders have yet to learn — all this two hundred and seventy years ago!

Schnitger and Silbermann specified diapasons and flutes in families. It took the English two centuries to follow suit — Arthur Harrison at Ely Cathedral.

Schnitger's full organ employed only diapasons, mixtures, and reeds. How many Tutti pedals are set as scientifically

today? Truly, improving is almost as much remembering as inventing. We retrograde by forgetting. The clean solidity of firm timbres must not be soiled by foreign tonal matter. We have so much more of the latter today than was available in the Baroque period that the advice is more important now than then.

Both the Silbermann and Schnitger diapasons (principals) were small as gauged by modern practice, averaging at 2′ C about 2″ in diameter. They had quarter mouths cut up about a quarter of their width, with languids nearly vertical, and light or no nicks. The Silbermann languid was very thick and therefore "high" and the top lip was pulled out. May I quote from my notes made at Ebermünster, where the three-manual Andreas Silbermann organ has not been touched, tonally, since its installation in 1730!

> Silbermann voicing is on the quick side — blows over easily by mouth. No top lip bevel, lip well pulled forward. Thick languids nearly vertical. Pipework crude by modern standards with wavering soldering of seams and plane marks showing on the metal. No mystery about the ensemble. Balance much the same as today. Great 4′ Principal flutier than the Unison, 2′ Fifteenth about same as 4′ Principal, but a trifle softer. Great and Positiv 8′ Bourdons very similar. Mixtures somewhat brighter material than 8′-4′-2′ stops. Great Cymbal III (22-26-29) louder than Great Fourniture IV (15-19-22-26). Positiv Fourniture (22-26-29) thinner tone (smaller scale) than Great Mixtures. 49-note manual compass. Two seconds plus reverberation. Enthusiastic reports undoubtedly chauvinistic.

Similarity of scales characterized the structural flues of any one manual, but the basic scaling differed with the manuals; so that while the general tone of one was substantial, the other was more pungent, etc. However, the same limited Pedal served for

all manuals, for what one manual lacked in power, as compared with the major flue-work, it made up in added intensity. At Ebermünster, this so-called automatic manual-pedal balance worked and the Pedal was adequate. But the principle was abused in Holland — as we shall see later. Today we are getting back to it.

The Baroque Pedal rarely had more than two 16′ flues. They were mild rather than robust. The Pedal Diapasons sounded somewhat like Bourdons — very suave. Pedal upperwork was often supplied in abundance (though there was none at Ebermünster); and Schnitger, especially, ran it up into high harmonics which stiffened, defined, and gave some resultant weight to a section that to twentieth-century eyes and ears is weak in 16′ tone. The individuality and contrast in timbres of manuals and the crispness of Pedal tone aided clarity in polyphony. Not only were the divisions clean and percussive but they were different. No wonder that Schnitger's and Silbermann's work sounds today as modern as tomorrow. There is nothing archaic about it, for the solid principles on which it is founded are eternal.

It was impossible for me to hear the Gottfried Silbermann organs near Dresden and Leipzig, but Rudolph von Beckerath tells me that those organs were "fresh — the freshest tone I ever heard." By this I understand him to mean highly colored and intimate. He says the secret of the Silbermann ensemble was slightly higher cut mixture ranks in the top octaves, giving a full, mellow effect. We must remember that these keyboards ran up only four octaves (from 8′ C). Dr. Oscar Schminke, who is thoroughly familiar with them, tells me that the unison ranks were clear and firm in the trebles. My own guess, from this data, is that the unison ranks were diapasonish and the off-unison mixture ranks fluty. (We hear much of how the mutations "dis-

solved" in the ensemble, and this line of thought explains this.) The sure recipe for silvery tone (the authentic "argentine" timbre) is to accent octaves and fifteenths through firm, agressive voicing.

Both the Silbermanns and Schnitger used the barred chest; so they voiced their chorus flue-work "quick" — sufficiently so to fit the chest-valve attack. The high languid gave rich timbre, as explained by my voicer friend.

These men knew what was what — they were real organ builders. Like tennis or billiard experts they knew all the shots. Within their concepts they did wonderful work, and we can relearn some of the fundamentals from them that have been lost sight of in the past hundred years. That's all they are — just fundamentals. Where we have fallen down has been in the lack of basic training — the basis of ensemble. But I believe our view today is broader, for it includes Father Willis' work, and Schulze's, which came over a hundred years later than the Baroque builders. Cavaillé-Coll, too, is too great a man to leave out. To omit these nineteenth-century geniuses from a mature organ concept would be unthinkable.

The Silbermanns chose a more fundamental structural timbre than Schnitger used. The Silbermann Diapason is a nobler sound than the Principal of Schnitger, of which it has been said that almost any tone of the same general sort would have done as well. However, it is always dangerous to generalize, and until one has heard all or most of the Schnitger work in the various acoustic conditions of the many churches in which it stands, judgment can be only partial. But *from what I have heard*, the South German tone averages mellower than that of the North, with greater dignity and less pungency. As long as chorus-work is cohesive, such differences in general timbre are no more than a matter of taste — and we shall leave it there. In this regard

it is interesting to note that Flentrop, the great Dutch builder, and Von Beckerath both told me they thought the general quality of the famous Weingarten Abbey organ was "too fat." I had to smile; I like their work, but I like Weingarten's silvery, mellow dignity, too. Weingarten is close down to Bodensee, near the Southern border.

A glance at a Schnitger and a Silbermann scheme shows definite normalcy. Strict obedience to harmonic law, nothing eccentric. Here they are:

SCHNITGER

Hauptwerk
Principals 8′, 4′, 2′, II Mixture, V-VI Mixture, III Cymbel, 16′ Quintade, 8′ Rohrfloete, 4′ Spitzfloete, 2-2/3′ Nasat, 2′ Flute.

Rückpositiv
Principals 4′, 2′, II Tertian, II Sesquialtera, IV-V Scharf, 8′ Quintadena, 8′ Gedackt, 4′ Blockfloete, 2-2/3′ Quintfloete, 1-1/3′ Flute.

Pedal
Principles 16′, 8′, 4′, II Rauschquint, V Mixture, 4′ Flute, 2′ Nachthorn, 16′ Posaune, 8′ Trompete, 2′ Kornett.

Look at it — the man never missed a trick! Over two hundred years later, in cold print, it still is thrilling! (As Schumann said of Brahms: "Hats off, gentlemen — a genius.") His work is as wonderful for what it leaves out as for what it puts in.

SILBERMANN

Hauptwerk
Principals 16′, 8′, 4′, 2-2/3′, 2′, 1-3/5′, IV Mixture,
III Cymbel, V Cornett.
Flutes 8′, 8′, 4′.
Reeds 16′, 8′ (Fagot-Trompete).

Oberwerk
Principals 8′, 4′, 2′, 1-1/3′, II Sesquialtera, III Mixture.
Flutes 16′, 8′, 8′, 4′, 2-2/3′, 1′.
Reed 8′ (Vox Humana).

Pedal
Principals 32′, 16′, 8′.
Reeds 16′, 8′ (Posaune-Trompete).

The Schnitger scheme is a much better piece of work. It has flexibility and color. The Silbermann is dignified but not as versatile; but it must have made a magnificent sound — that Great and Pedal! Here, in both organs, are very complete diapason choruses along rigid, fixed harmonic lines. Both builders knew they could not change Nature's mold. This form is as valid today as it was in 1725 and as it will be in 2025. Note how superior for polyphony is the Schnitger system, how inadequate in color and upperwork the Silbermann Pedal, how flexible and rich the Schnitger Pedal. The Silbermann Pedal is almost Victorian English. If one were to boil down Schnitger and Silbermann on the basis of what these two schemes reveal to two words, they would be these: vivacious and noble, respectively.

Out of these types has grown the modern German organ, which by comparison is decadent. The tone has grown coarse and rough, though again, it is dangerous to generalize. The impression I get is "Hindenburg doing the goose-step" — an uncompromising Prussian sound. This retrograde movement has brought about in Germany a return to Bach and pre-Bach organs, some of them very simple and small. It might be appropriate to quote Dr. Albert Schweitzer, who wrote me: "I dislike controversy, but when they asked me to play Bach on these little organs I had to speak out. When I ride I want a real horse — not a pony — and the worst of it is that professors of musical history (not organists) who are responsible for this trend say they are only carrying out my ideas!"

And yet, this modern German organ surpasses the Schnitger, Silbermann and Dutch organs in the ability to accompany congregational singing in a magnificent way. It is not easy to play; it insists on having its own way; but put it down the groove for which it was specially fashioned, the accompaniment of lusty

chorale singing, and it is thrilling. The upper-work has a silvery Fifteenth that puts a "leading edge" on the guiding top line, and it is just the right power for the duty. Underneath the singers is a powerful, rough, reedy Pedal on which the united song and organ rest. The middle line is taken by the singers. It is not good judgment for the organ to compete for that middle line. My old friend, the late Willoughby Williams, for twenty-four years coach at the Dresden Opera and intimate friend of Siegfried Wagner, used to tell me, "This German organ is an intractable brute, but for accompanying chorale singing it has no rival." As Mr. Williams was accompanist to Clara Butt, a protege of Basil Harwood, and organist of the great Schulze in Leeds Parish Church, he ought to know!

The modern Danish organ is a tangent of the North German concept. I confess that the first time I heard recordings (most excellent ones) of it I was fascinated — and I still am. But I also remember the sage words of Dr. Schminke — he went to considerable length to make it clear that Thuringians and Prussians are as far apart as the poles (no pun intended); two different races, unlike in character or in their music.

Now that I have heard the best and newest Danish work, I can say firsthand that some of the tonal groups, such as Krumhorn and Sharf, for instance, are the spikiest made — inspired, apparently, by Loki's screams while his goddess-wife emptied the venom cup — an aural vitriol just this side of torture. The Danes have gone to extremes in their poisonous Positivs. They will put fourteen ranks of pipes in one meter's depth — and that means little pipes, small scaled pipes that give out a hydrochloric acid tone with a vinegar chaser. The strange thing is that the Danish work is as fine as any made, in most respects — the integrity of the materials and the workmanship are past all question — absolutely top-grade. The timbre of the major flue-

chorus is quite normal, and the cohesion is perfect. But when it comes to Positivs, they have gone far too far — most unmusical.

Also, they exaggerate the weakness of their nearest rivals' Pedals. I tried a new 3-45 in which the sole Pedal 16′ flue was a metal Diapason whose CCC pipe was not more than 7½″ in diameter! I learned from listening to Danish organs in their churches not to trust too implicitly what the phonograph records displayed. Flutes that charmed (on the record) were dull *off* the record. The "mike" can play strange tricks. Many of our own flutes excel the best the Danes possess. Their mutations are big and pungent. They know the value of the Nineteenth. The Danish reeds are as good as any on the Continent. These men, whom I watched at work, are experts. No false moves. They went straight to the goal. Regulation of reeds superb, but trebles *weak*. It is not possible for *anyone* to make adequate trebles of reeds voiced on 2″ wind, or even 3″.

They also overemphasize loud 2′ stops, some of which are quite fluty. This sort of thing is indigestible; it veers away from the composite and leads back to the highly specialized. We have not much use for it.

If one could say that the weightier Silbermann and English ideals are roast beef with normal seasoning, then the Danish concept is a pound of salt to a pound of meat, with pepper thrown in for good measure.

I remember a Gedecktfloete on a Danish record that sounded like a boy's voice. An English friend once wrote me about the huge scale Rohrfloete on the Hauptwerk at Steinkirchen. I looked forward to hearing the originals. When I did, I found the magic missing. The flutes in question had *some* harmonic development but not nearly as much as Chimney Flutes to be

found in America. The Dirk Hoyer example at Steinkirchen dates from the sixteenth century, and this art of flute voicing has been flourishing in Europe since before then. But they do *not* get that hidden little octave coupler effect with the thin thread of dark string that some of our metal Bourdons have. We beat them at their own game. They are connoisseurs, and they would be the first to admit it. Our best mutation work also excels theirs. Our mutation "bell-tones" knit together better than theirs. They do specialize in a sort of "gong" effect (very fifthy) in their 8′ Bourdon basses that we have not as yet captured — and this is delightful.

The Danish system rings the changes on a few basic colors and pitches. One section will have 8′ Gedecktfloete and 4′ Spitzfloete, another will exploit the 8′ Spitzfloete and a 4′ Gedecktfloete. In one division there will be a loud 4′ and a soft 2′, in a contrasting section it will be soft 4′ and loud 2′. The 4′ may be fat and the 2′ thin; or the 4′ thin and the 2′ fat — and so on and so on. In this way they capture sectional ensembles of really divergent color and nature — and most skillfully.

A former secretary of the London Organ Club writes me that visiting Danes were not particularly impressed with the Willis in St. Paul's Cathedral, London. To the Norsemen it must have been completely incomprehensible, quite outside their ken — their little province. There is nothing in the Danish organ remotely like the daring diapason work and the thrilling, ringing trumpets and tubas of that great masterpiece — that organ which in many ways still leads the world. The two systems are as unlike as the two languages. The majestic grandeur of the stupendous flue and reed work at St. Paul's compared with what Danish work I have heard is like Bach to Offenbach. Danish organs represent intensive cultivation of a small garden — St. Paul's takes in the world.

One evening five of us had St. Paul's to ourselves. Dr. John Dykes Bower played and then Dr. Robert Baker played and Dykes Bower listened. I had asked Dr. Baker to show off the Schulze chorus in the dome, added in 1949. I said to the great Englishman, "It sounds like golden rain." The conversation went on. A few minutes later he turned to me and said, "Yes — just like golden rain."

I heard some more "golden rain" in Holland — but that comes later.

The Danish organs are built with bar and slider chests and tracker action. They are prompt in response and of superlative workmanship. Sometimes the sliders are vertical instead of horizontal. This economizes space; but a celebrated English builder who recently toured Europe tells me the efforts of the Scandanavian builders to overcome the failings of the barred chest are quaint; they are trying expedients discarded in England a hundred years ago.

A typical Danish scheme is that of the 1952 Marcusson & Son organ in Varde Church, tracker action throughout with slider soundboards.

Hovedvaerk		*Rygpositiv*		*Brystvaerk*		*Pedal*	
Principal	8′	Gedakt	8′	Gedakt	8′	Subbass	16′
Rorflojte	8′	Quintadena	8′	Rorflojte	4′	Oktav	8′
Oktav	4′	Principal	4′	Principal	2′	Rorflojte (borrowed)	8′
Spidsflojte	4′	Gedaktflojte	4′	Gedaktflojte	2′	Oktav	4′
Spidsquint	2⅔′	Gemshorn	2′	Nasat	1⅓′	Nathorn	2′
Oktav	2′	Oktav	1′	Cymbel	III	Rauschquint	IV
Mixture	V	Sesquialtera	II	Regal	16′	Fagot	16′
Cymbel	II	Scharf	III			Trumpet	8′
Trumpet	8′	Dulcian	8′			Skalmeje	4′

There you have it — it sounds just as it looks: pungent, bright, telling colors and color possibilities; thin, ingenious sectional contrasts (based largely on pitch); a general squeezing of the orange to the last drop of juice. The organ is right out in the open where every harmonic carries to the listener. (There is a

case around the pipes, but just the same the organ is right out in the open — I anticipate objections!) The *en chamade* Trumpet (more than likely English spelling) ices the cake. (There is no need for hearing aids!) Note that the one Pedal 16′ flue stop indicates that the manual registers are similar in strength. The Brystvaerk may be even more astringent than the Hovedvaerk, but the same Pedal will do for both. It makes playing simple. It also — we somewhat gloatingly remark — makes it a bit less flexible from the variety standpoint. The Danish organ tonal diet is strictly *table d'hôte*. You take it and like it— or you don't.

There is a (fortunately) decreasing clique of vocal "Baroque" enthusiasts who would willingly write off anything developed since 1750, or perhaps 1650. They are the devotees of the bar and slider chest and tracker action, who believe they can control the attack of a tracker valve regardless of the uniform nature of its opening once the "pluck" is broken, and who ignore the tuning faults, the humming of unwanted notes within a chord, the initial gasp of the slider chest attack.

Admitting the many virtues and lessons of the early Baroque work, and the advisability of incorporating some of these into modern design as adjuncts to the more comprehensive organ, we refer these parties to Dr. Albert Schweitzer, who wrote me: "Je n'aime pas du tout les orgues baroques." He thinks Silbermann organs go back far enough and should be the basis of modern planning.

CHAPTER 6

The French Baroque and Modern Organs

THE FRENCH are very logical and hence, unchanging. Principles they found good in Baroque days have merely been developed and elaborated, rather than replaced by new and different ideas. The French Baroque ensemble depended on reeds for its major power, as does the present French system growing out of Cavaillé-Coll's great work. The main difference between the old and the new French organ is the Pédale, which in the seventeenth and eighteenth centuries was quite limited, in some cases lacking any but 8′ stops, and adapted, as a sort of third hand, to playing French music of the period. Cavaillé-Coll brought the Pédale to a full splendor unmatched by any school, in his magnificent organ in the Cathedral of Nôtre Dame de Paris, where the various series of mutations are supplied separately rather than in mixtures, so that they can match the context of the manuals.

The original French foundation stop — the Montre — was a woolly diapason, hardly more than a flute, and was flanked by Bourdons of somber coloring; but always these voices were illuminated by delicate mixtures of unforced diapason tone and by extraordinarily effective, bold mutations. The colorings were necessarily synthetic. It remained for Cavaillé-Coll to develop the Flûte Harmonique, the broad Gambe and various orchestral reeds before the French organ evolved from its original naive simplicity.

But from the first, chorus reeds were featured and were brought to a high degree of perfection by Cliquot in the last

half of the eighteenth century. These trompettes were large scale, with small shallots, and almost straight tongues. There is a trick to this system, in that the small shallots, with minimum air content under the tongue, develop a high degree of brilliance arising from a preponderance of high harmonics. There is nothing whatever of "honk" in this tone. The large scale resonators magnify this "clean" tone — or at least conserve it — and the result is great power, great brilliance and not a trace of thickness. There is no reed timbre as dramatic as the French Trompette. This quality persists down to 32′ C and at 16′ C is the *beau ideal* of Pédale reed tone, superior to any other. In the 8′ gamut it also excels in fire any other type of reed.

These early trompettes, probably because of the always-present difficulty of wind supply, were voiced on very low pressure, something around 2½″.[1] Consequently they had to have very thin tongues, and to yield the utmost in power were voiced "flat on the spring" so as to uncover a maximum area of shallot opening. The long tongues plus the parallel shallots used (then and now) gave instancy of attack and tremendous volume and brilliance. With an equal amount of wind such reeds produce more tone than flue pipes, and they dominate the early and the modern French instrument. The French Trompette is the French Trompette — no compromise — a blatant power apparatus suited to big churches, a characteristic timbre and *eclat* apparently nationally standardized. The French consider it that way, and if the scheme calls for a trompette, a trompette it is — even if the organ goes in a residence. Acoustics, space, mean nothing; the trompette is unswerving. In its translation or transplanting to this country in its native self, no mistake could be worse than to put it in a small dead church. It was never de-

1. The 1797 Cliquot in Poitiers Cathedral is voiced on 85 mm. (about 3½″), for the explicit purpose of getting superior reeds. The diapason work does not suffer. It is beautiful.

signed or made to serve in such, but thrives in majestic dimensions and effects.

Its domination probably brought about its early segregation. Its character was best when undiluted and unmixed. Consequently we see eighteenth-century organs with a manual devoted to 16′, 8′ and 4′ trompette tone, and this manual complement of reeds has been standard in major French work ever since. The development of the typical French Toccata style of composition was very likely influenced by the instant speech of these pipes. Certainly less prompt reeds would never have encouraged such exploitation.

I once had the peculiar good fortune to attend a private recital by André Marchal on the Gonzales restoration of the Cliquot organ in the Chapelle Royale at Versailles. The program was made up of Couperin's music. Here, if ever, was an authentic anachronism. All that was necessary to complete the illusion was for the king and his court to walk into the room. As the music of one of the larger pieces moved to its climax — and it most assuredly moved — the tone of the organ rose to a thin frenzy; and that is the best description I can give of the eighteenth-century French plein-jeu — as French as France.

Cavaillé-Coll carried on from this conception, after the lapse following the Revolution and the turbulent days up to 1848. The story of his patronage by the great Rossini, with the capture of the St. Denis contract, followed by Napoleon III's generosity to the church, tempts one to believe in a good fate. The times produced the man. Cavaillé-Coll either originated or developed the idea of a flûte plus gambe rather than an exclusively montre foundation for the flue chorus-work. This is a subtle conception indeed. It places the onus of foundation on the 4′ pitch rather than the 8′ and asserts that the timbre of the 8′ stops can be heterogeneous so long as it is topped by pure

diapason-mixture tone. This is in direct contrast to the English system of several unison diapasons in the Great. It is a distinction with less difference than at first blush might seem the case. For what the French called a Salicional might not be too far in timbre from an English Third Diapason, etc. But this system led to a greater variety of color than the multiple diapason plan and an avoidance of extra diapason weight. It was also based on the general idea of scaling the varied unisons on the smallish side — *to keep their power down and make them useful.* What was the use of ponderous flues when the trompettes furnished the climax to the ensemble! It will be interesting to see how the same idea obsessed Father Willis, only a few miles away across the channel, when his magnificent reeds became too good to be hidden and came to be his ensemble. He, also, profited from the consequent lesser power and greater utility of his supporting flue-work.

The average French organ gets about two-thirds of its full power from chorus reeds, for the low wind flue-work is not meant to trespass on this function. Its very gentleness makes it all the more useful — all the more frequently heard. Low pressure facilitates voicing of flue basses, but it leaves trebles disproportionately soft. To remedy this it became common practice to divide the chest, using low wind for the lower registers and high wind for the higher ones. Father Willis also did this in England. To the organist "low wind" is a magic word. Somebody has told him so. Somebody ought to tell him that it is not entirely so; certainly not for mechanisms; and in some ways, not for voicing. "Low" wind is, also, an elastic term. Some lows are lower than other lows. There is no need to go to extremes. Who could swear that he could tell 3½″ flue-work from 4″? Yet 3½″ pressure is the very top allowed by the amateur designer

— as a rule. Aristide Cavaillé-Coll did not altogether subscribe to this dictum. He lived in a world of reality, not theory.

I do not know just when or where the French *open* mutation pipes originated. They are large scale, very low cut, unnicked, and yield a clear, *firm* tone of good power. They have something to say. Their relatively large scale, compared with the flue-work they supplement, makes them excellent blenders and telling pigments.

Cavaillé-Coll changed with enlarged experience, and it is hard to believe that the same man who made the ordinary organ in the Madeleine also made the masterpiece in Nôtre Dame. It must have tested the loyalty of his supporters to change with him. Zealots, be warned! Words can be indigestible; be careful how you use them — your idol may make you eat them. As an object lesson in "before" and "after" of organ designing, we present below the schemes of these two organs. The Madeleine instrument was built in 1846; Nôtre Dame, in 1868, and restored in 1894. The schemes are their own testimony — no comment is needed. One can see the rigidity of the one and the flexibility of the other at a glance, and that great mind moving to its final conclusions and working out in a complete manner the logic of its basic premises. Even Cavaillé-Coll needed time for his flowering — let us not be discouraged.

Église de la Madeleine (Paris)

Grand-Orgue		*Bombarde*		*Positif*	
Montre	16′	Sous-Basse	16′	Montre	8′
Violon-Basse	16′	Basse	8′	Viole de Gambe	8′
Montre	8′	Flûte Harmonique	8′	Flûte Douce	8′
Bourdon	8′	Flûte Traversiere	8′	Voix Céleste	8′
Salicional	8′	Flûte Octaviante	4′	Prestant	4′
Flûte Harmonique	8′	Octavin	2′	Dulciane	4′
Prestant	4′	Bombarde	16′	Octavin	2′
Quinte (2-2/3′?)	2′	Trompette Harmonique	8′	Basson et Hautbois	8′
Doublette	2′	2me Trompette	8′	Clairon	4′
Plein-Jeu	X	Clairon	4′		
Trompette	8′				
Cor Anglais	8′				

Recit		*Pédale*	
Flûte Harmonique	8′	Quintaton	32′
Bourdon	8′	Contrebasse	16′
Musette	8′	Basse Contre	16′
Flûte Octaviante	4′	Violoncelle	8′
Octavin	2′	Grosse Flûte	8′
Voix Humaine	8′	Bombarde	16′
Trompette Harmonique	8′	Trompette	8′
Clairon Harmonique	4′	Clairon	4′

Église Metropolitaine de Nôtre Dame (Paris)

Grand-Choeur

Principal	8′
Bourdon	8′
Prestant	4′
Quinte	2-2/3′
Doublette	2′
Tierce	1-3/5′
Larigot	1-1/3′
Septième	1-1/7′
Piccolo	1′
Tuba Magna	16′
Trompette	8′
Clairon	4′

Grand-Orgue

Violone-Basse	16′
Bourdon	16′
Montre	8′
Flûte Harmonique	8′
Viole de Gambe	8′
Bourdon	8′
Prestant	4′
Octave	4′
Doublette	2′
Fourniture	II-V
Cymbale	II-V
Basson	16′
Basson-Hautbois	8′
Clairon	4′

Bombarde

Principal-Basse	16′
Sous-Basse	16′
Principal	8′
Flûte Harmonique	8′
Grosse Quinte	5-1/3′
Octave	4′
Grosse Tierce	3-1/5′
Quinte	2-2/3′
Septième	2-2/7′
Doublette	2′
Cornet	II-V
Bombarde	16′
Trompette	8′
Clairon	4′

Positif

Montre	16′
Bourdon	16′
Flûte Harmonique	8′
Salicional	8′
Bourdon	8′
Unda Maris	8′
Prestant	4′
Flûte Douce	4′
Doublette	2′
Piccolo	1′
Plein-Jeu	III-VI
Clarinette-Basse	16′
Cromorne	8′
Clarinette-Aigüe	4′

Recit

Quintaton	16′
Diapason	8′
Viole de Gambe	8′
Voix Céleste	8′
Flûte Harmonique	8′
Flûte Octaviante	4′
Prestant	4′
Quinte	2-2/3′
Octavin	2′
Plein-Jeu	IV-VI
Cornet	III-V
Bombarde	16′
Trompette	8′
Basson-Hautbois	8′
Voix Humaine	8′
Clairon	4′

Pédale

Principal-Basse	32′
Contrebasse	16′
Soubasse	16′
Grosse Quinte	10-2/3′
Flûte	8′
Violoncelle	8′
Grosse Tierce	6-2/5′
Quinte	5-1/3′
Septième	4-4/7′
Octave	4′
Contra-Bombarde	32′
Bombarde	16′
Basson	16′
Trompette	8′
Basson	8′
Clairon	4′

CHAPTER 7

Some Comments on the English System

IT HAS BECOME THE FASHION lately among the young of this country to decry English organs, and one of my close friends some time ago wrote me that he felt I was injuring my cause when I praised them. As is usually the case, this criticism rises out of lack of understanding of the purpose and object of the English church organ. The shining exponent of this system of design was Henry Willis (1821-1900) who envisioned a sound worthy of an English Cathedral, and then made it. Something of an accomplishment! Its essence was majesty. It was intended to accompany the service of the English church, and in the main was not meant to be a concert instrument. But this proves not so, for the St. George's Hall 1855 organ in Liverpool stands even today as perhaps the finest organ in the world for most purposes.

The quality that sets the English organ apart from others is *scope*. I remember the first real "cathedral" organ I ever heard, the Harrison and Harrison in All Saints', Margaret Street, London, with Lynnwood Farnam playing it. The general impression my innocent mind got was that of a man who, wandering through a strange land in quest of a waterfall, runs suddenly into Niagara Falls. It was as overwhelming as it was unexpected; I found many more instruments even more so.

It is not the best judgment to run down a people who have produced Shakespeare, and I want to take time off to tell a story of how I first heard the celebrated St. Bee's Priory Church organ, the last organ Father Willis personally finished, in 1899. I had gone to the tiny Cumberland Village, which dates back to about 700 A.D. at least, to visit Col. George Dixon, that grand old man of English organ design, who had his finger in many

a cathedral organ pie — because he was asked to put it there. I was to meet Col. Dixon about nine in the morning and be shown the Priory and the "Willis" (as he always referred to the organ). But I could not wait. I finished breakfast and strolled down a stone-walled lane that led to the churchyard and looked out over the gently rolling land toward the Norman tower of the church. My path took me to a turning, where I was greeted by a rough-looking customer straight out of the pages of Phil May. He wore a broken-visored, dirty cap, a muffler-scarf wrapped round and round his neck, covering the top of a vest of a different color from his coat. His trousers were not contemporary, his shoes anachronisms. Under furry eyebrows glittered a pair of intensely blue eyes and about his mouth was draped a coffee-strainer moustache untouched by shears. A beatific smile illumined all. His opening remark was, "Good-morning; I have just been listening to a thrush."

He went on, "A bonny bird is the thrush." I agreed that the thrush was, indeed, a bonny bird. I then kept still and let him talk. He asked me if I was interested in mosaics, saying that he had just come into possession of a golden mosaic in the style of Giotto depicting the flight of Kublai Khan. (I looked this up at the first opportunity and found that Giotto was indeed the father of the golden mosaic.) Pursuant to this he went on, "A thing is neither better nor worse for being praised, and an emerald will shine none the less though its worth be not spoken of." I was thankful I recognized that as Marcus Aurelius — though he told me it was, in the next breath.

By that time we had come to the church gate through which he led me and showed me the deep holes in the church wall where the starlings nested. He than pointed out a considerable monument to the St. Bee's boys in the first World War, saying, "I set that stone — I'm a bricklayer."

Ah, yes! — and so was Ben Jonson. You cannot write off a nation with men like that, no matter what they do or make. I hope you will now be in the proper frame of mind to accompany Col. Dixon and me through the West-end Norman door of the Priory and listen to the Willis.

You put your foot across the threshold and step into the Middle Ages. The floor is of rough uneven stones, the piers of the nave are round, hexagonal and "clustered" — and none of them stand straight. With my eye, I lined them up against the windows and know this is true. You momentarily expect a man-at-arms with sword and shield to clank his chainmail down the aisles — he would be more at home there than you are. Three lancet windows with sills four feet thick throw light patterns that change with the minutes. A hideous screen of iron work desecrates the chancel — the untimely gift of some well-meaning baron of the Victorian age. But in the South transept stands the Willis back of a magnificent English Oak case with angels playing trumpets — a preview or audition of what you are about to hear.

The Willis is a "reed" organ. Willis flues add little to *tout ensemble.* The utterly magnificent chorus trumpets take over as the crescendo grows. The glory of that solid-as-iron tonal fireworks is something never yet quite paralleled. One has to live to hear a Willis Great to know what a Great can be. It is hard to conceive of a more beautiful sound, a more kingly effect. Col. Dixon had shown me a letter written him by Henry Willis in 1897, in which that capable thinker listed a series of Willis organs "all built to this magnificent system." He had a system. I wonder if we realize and appreciate just what it was.

Its major features, as set forth in the St. Bee's organ, which followed in 1899, are three batteries of chorus reeds, subtly differentiated, and leading up to a climax of grandeur unmatched

in any other national system of ensemble. The gist of the plan, aside from the individual stop perfection and position assignment, as well as the progressive sectional ensembles, is that the reeds dominate and are the sectional and *tout ensembles*. Thus the flue-work is secondary in power and consequently ubiquitously useful. A shrewd finesse indeed, shared, as we have seen, by Cavaillé-Coll, even though the two conceptions are dissimilar.

At St. Bee's the Swell chorus reeds are what they are because the Great and Choir reeds are what *they* are. They are mentioned first because they are the least powerful and start the reed progression of timbre and power. And yet there is a primary reason for their color that is independent of the other sections. They are Cornopeans — not Trumpets — because a natural crescendo is always from soft-bland to loud-bright tone. This was Father Willis' mature choice and conclusion after fifty years of cathedral work. The reed progression, if logical, *must* begin with Cornopeans, not Trumpets. He got that part of his program right but he muffed the equally patent fact that bass-treble pitch progression is from rich to pure timbre! His Swell Double, Unison and Clarion are correctly powered, but partially inverted harmonically.

As immutable as the soft-bland to loud-bright crescendo is the law that low tone of any category is naturally richer than high tone. This law operates in a piano, a violin, the orchestral flute, the human voice, etc., etc. Therefore, instead of the conventional arrangement of bland double reed, brilliant unison, compromise clarion, the correct gradation is double richest, unison slightly less so and clarion blandest. This line of thought can be supported by recalling how little *fundamental* 16′ reed tone is needed for chorus balance. (The substitution of the 16′ Clarinet for the Double Trumpet is arguable because of its richness and its weak fundamental.) Any reed pipe illustrates the

law — tune it flatter on the spring and increase the harmonic content. Sharpen it with reverse effect.

Although they were Cornopeans, those Willis examples had a core of iron. Our earlier quoting to the effect that there is an optimum power-quality point in the voicing of every pipe that must be reached, but not passed, was illustrated by Father Willis to the letter. The Willis Cornopean got its solidity not from being a big pipe and shallot softened down to the right relative power, but from being the *right scale blown to optimum capacity*. Every pipe carried a "sting." Practically every builder could take this lesson to heart and profit from it today.

The Great 8′ and 4′ Trumpets are outside expression boxes at St. Bee's and on the same wind (7″) as the enclosed Cornopeans (economy and good sense). They are slightly bigger scales than the Swell reeds with somewhat greater harmonic development, and their trebles are so gorgeously welded to the flue upper-work that the union is indivisible. The reeds "extend" the flues, while imbuing them with a regal glitter to which no flue can aspire. The Tuba on the Choir, unenclosed and on 15″ wind, has a bass-tenor range that "snorts," a middle that "sears," and a treble that is "pyratomic." A reed *tutti* at St. Bee's — manual and pedal — is guaranteed to convert the stoniest hearted critic.

Why is it that this "magnificent system" is not followed today? The shortest answer is that the whole project hangs on the perfection of the reeds, and in this country of "magnificent distances" and present day labor costs, such finishing as Father Willis gave them is commercially out of the question. But the Willis-Cavaillé-Coll principles bear consideration today. It costs no more to design thoughtfully and reasonably — with thought and reason — than it does to cling blindly to outmoded tradi-

tion and ill-matched parts. A shot of Willis-Cavaillé-Coll logic can knock such "thinking" into smithereens.

So much has been written about the famous St. Bee's Willis by its patron, Col. Dixon, and others better qualified than I, that I shall merely give the specification so that the reader can see for himself that the scheme resembles an athlete trained down to hard muscle, without a superfluous ounce of flesh. The specification disdains ornaments and concentrates on essentials. I can also state that its color flexibility is astonishing, largely because of the individual stop beauty (there never were lovelier voices) and the way they fit together. This is a 35-register cathedral organ, equivalent to the usual one of twice that size. All the major effects are there, in superlative fashion.

The St. Bee's Willis (1899)

Great		*Swell*	
Diapason	16′	Open Diapason	8′
Diapason	8′	Gemshorn	4′
Stopped Diapason	8′	Flageolet	2′
Principal	4′	Mixture (12-19-22)	III
Hohl Floete	4′	Vox Humana	8′
Wald Floete	4′	Oboe	8′
Twelfth	2-2/3′	Contra Posaune (7″)	16′
Fifteenth	2′	Cornopean (7″)	8′
*Cornet (17-19-22)	III	Clarion (7″)	4′
Tromba (7″ wind)	8′		
Clarion (7″ wind)	4′		
Solo (Choir)		*Pedal*	
Salicional	16′	Double Open Diapason (to GGG)	32′
Viol d'Amour	8′	Open Diapason (wood)	16′
Voix Céleste (Tenor C)	8′	Open Diapason (Great)	16′
Claribel Flute	8′	Sub-Bass	16′
Concert Flute	4′	Octave (from open wood)	8′
Harmonic Piccolo	2′	Flute (from Sub-Bass)	8′
Clarinet	8′	Double Ophicleide (15″)	32′
Tuba (unenclosed) (15″)	8′	Ophicleide	16′
(Flue-work on 3″, 3½″ and 4″)			

* Added by Harrison and Harrison at a later date.

After leaving St. Bee's, the next stop is St. Bartholomew's, Armley, a suburb of Leeds, to hear the famous instrument by Schulze. If the Willis is a "reed" organ the Schulze is a "flue" organ. Here again one is confused by the overwhelming splendor of what an all-out flue chorus done by a master can be. The Schulze needs reeds no more than the Willis needs flues. The flue organ is about as subtle as a tank. All that is needed to make it is medium to medium-plus diapason scales throughout the chorus — double to mixtures — blown to the absolute limit. The ideal unison used by Lewis, the great student and worshipper of Schulze, was about our scale 43 (which is 2-3/16″ diameter at middle C), with quarter mouth cut up about 27%, blown on 3½″ wind with a foot hole in the 2′ pipe of 7/16″. Any voicer knows what dynamite that is.

Schulze sometimes varied his chorus scaling, but at Armley every chorus rank, including the famous V-rank Mixture (which William T. Best called a "stroke of lightning," and which is very clumsily composed, by the way) is the same size. The trebles have no feet at all — they run straight down from the languid. Frankly, the sound of much of this Great, before the mixture is drawn, is not too beautiful. It sounds too much like what it really is — sub and super couplers on the unison; and the timbre is so "maximum" as to offend any but the most experienced ear.

But when that terrific, and better placed, mixture is superimposed on the 16′, 8′, 4′, 2-2/3′, 2′ diapason ranks, the whole coalesces into a crystalline mountain drenched in sunlight. There is absolutely nothing else like it in the whole world. If this sounds extravagant, just recall Turner's famous reply to the old lady who said she couldn't see such color in sunsets as he painted — "Don't you wish you could!"

The flue organ is as Germanic as the reed organ is English, so it suffers, in comparison, in variety of sectional contrast. Schulze, though in England for years, never learned to sympathize with the English full Swell; his work lacks the scope his later imitators injected into theirs — notably Lewis at Southwark, and Michel and Thynne at Tewksbury, to say nothing of R. W. Davidson's magnificent choruses along Schulze lines today, than which there is nothing finer. However, it is a simple matter to make a Schulze chorus — what one mainly needs is the proper church. The rest is easy — if you know how.

It is customery to speak of Willis and Schulze organs with no more than their major effects in mind — we forget that their secondary choruses and registers were fully up to the primary stops in quality. And why not? Does anyone suppose that genius stops short at fixed limits? Schulze's flutes and strings were remarkably imitative and beautiful, and they were scaled to blend. And as for Father Willis' Swell diapason chorus, the late Sir Walter Alcock told R. J. Piper, of the Austin Company, who passed the word to me, "It is the most beautiful sound my ears have heard on this earth." There is a reason for this quality that so captured Alcock. Every possible scaling and voicing trick was employed to get the utmost in silvery timbre, and we may be sure that Father Willis' utmost resources in this direction went further than the usual.

In the sense that Baroque Continental organs are adapted to polyphony, the Willis and Schulze organs were not made for playing Bach — not in the Continental manner. They lack mutations — which as late as 1930 Arthur Harrison told me he "saw no use in." A strange thing for a really great master to say — but he elaborated by explaining that he could make (in single pipes) the tones obtained from mutations plus unisons. That, I doubt. It is perfectly just and accurate to state that

Willis' secondary mixtures, as well as Arthur Harrison's, were fully as good as the best Continental efforts. Just as much genius went into them, and the excellence of the voicing has never been equaled, let alone surpassed. In regulation the English work so far excels the French as to admit of no discussion. But such unique, quaint timbres as the Danes obtain from larigots and unison flutes were either unknown to English masters or considered undesirable. The English Pedal was in the main a stodgy affair lacking in upper-work. Schulze, for all his Germanic background and training, did nothing much to change this. His Tyne Dock Pedal is a 16′ and 8′ affair without a trace of life in it. However, take a glance at the Pedal of the 1855 Willis in St. George's Hall, Liverpool:

Double Open Diapason (wood)	32′	Quint (metal)	5-1/3′
Double Open Diapason (metal)	32′	Fifteenth	4′
Open Diapason (wood)	16′	Fourniture	V
Open Diapason (metal)	16′	Mixture	III
Salicional	16′	Posaune	32′
Bourdon	16′	Contra Fagotto	16′
Principal	8′	Ophicleide	16′
Flute	8′	Trumpet	8′
		Clarion	4′

There is a Pedal to hold its own, on paper, in any company. When we consider that the stops themselves would make most Continental work look and sound like toys, the full import of what Henry Willis had in his mind and actually made is apparent. There are 33 ranks of mutations and mixtures in the entire instrument in this greatest forward step (as it has been described) in organ design and building.

Do the critics still think it wouldn't play Bach? The *organ* did not object to Bach — it was the *organists* who interpreted him in their own manner. Universal (foreign) condemnation sits in heavy judgment on the English way of playing Bach — but to date I have heard practically nothing said against Vierne's

playing it on full organ at Nôtre Dame. And on second thought, I don't believe anyone is going to have the courage to inveigh against that uniquely superb combination of mind, Nôtre Dame, Cavaillé-Coll and Bach. To me, the way he did it — in that place, on that organ, *that music* — seems in scale — right!

The world is full of little people, and we must not pay attention to them. Perhaps the English Bach is not as bad as they say it is.

Today we can, as from a distance (not an eminence) look back at (not down on) English and Continental design of the past with unprejudiced detachment. Shall we embody some of those systems in what we now make? Shall we, on the ground that we are enabling moderns to hear ancients as ancients heard themselves, go back to 1700 and put a question mark after most of what we call progress? Or shall we retain 1700 work for its historical interest and go ahead?

If we attempt an "old-new" concept, embodying the virtues of both, we must work as Father Willis worked within his frame, subordinating detail to integer. Every diapason, flute, string, reed; every double, unison, octave; every type of upper-work and mutation must take its disciplined place in a whole whose beauty is measured by its unity, its flexibility, its utility. Handsome is as handsome does.

One might say that the organ is something like a society whose harmony and efficiency depend on the simple law of consideration for others, a maturity of sophistication that will put an end to traffic accidents, divorce, and recalcitrant stops and schemes.

CHAPTER 8

Holland

THE GREAT OLD DUTCH ORGANS! It would be much more just to add — in the great old Dutch churches! Three or four hundred feet long, up to a hundred feet high, with four to six seconds of reverberation, these churches would make mediocre work sound good — and in many cases that is exactly what they do. For the Dutch system of ensemble and balance is easy to criticize, and frequently the Dutch single stop voicing, too. It is hard to understand the highly vocal enthusiasm of visiting amateurs who cannot separate these organs from their favorable churches and who confuse size with quality.

One day a Dutch builder and I were discussing the rave reports by an American organist on an eighteenth-century organ in a city near Amsterdam. I said: "So good a man — what's the matter with his ears? You and I both know what to listen for and how to listen to it — and you know as well as I do that those Pedal reeds are not good." He answered, "Why certainly!" — and laughed.

Reeds have always been a problem in Holland. The low wind necessary to the flue-work and the tracker action put a handicap on all reed voicing. The trebles are never, never *can* be, adequate. The timbre sought varies; builders differ; but it is not as bright as the French. It is designed to sink into the flues without a trace. "Blend" is the word they use in describing the ideal reed function; "fuse" would be a better one.

But although it is unfair to judge Dutch work by our standards (the true criterion being to see if they hit the mark

they shoot at); by international art standards, even, we can point to a major Dutch weakness, which is the totally inadequate 16′ flue Pedal. I have taken this up with the two men who are, in my opinion, the best in Northern Europe, and one of them finally said, "Perhaps we are wrong."

When one speaks to the Dutch or North German of this deficiency, saying that a sturdier 16′ Pedal Diapason underneath their magnificent manual flue-work would double its majesty, they fall back on their stock answer: "Our Pedal is right for polyphony." But the obvious reply is: "Yes — but you don't play polyphony all the time." The first thing they show us — and with justifiable pride — is their thrilling, "solid silver" flue chorus. Sometimes it has "gold" in it (strong fifths). Any Sunday morning, in any metropolitan church you will hear elaborate and excellent homophonic improvisations on the announced chorale, preliminary to the congregation's joining in. This happens three or four times at every major service. Polyphony? No. During these improvisations the Pedal 16′ flue is less audible than the manual double! The Pedal 16′ reed is far from being big enough to carry the load (though too big for polyphony) — an unfortunate compromise. Play this Pedal reed note by note at the console and you will probably find it uneven, buzzy, slow, and unattractive in timbre.

In the same breath let me hasten to exclaim over my admiration for some of the Dutch manual flue chorus-work — not the old, for it is not as good as the new. 1955 builders profess their reverence for Schnitger; but if Schnitger's voicing was no better than most of the untouched old work, the "restorations" are improvements. Let me qualify this by saying that the sixty-stop Schnitger at Zwolle, Netherlands, has such a "restored" chorus, even down to meticulous repairs and readjustments of the smallest old mixture pipes, that the completed "new" chorus

holds its own with anything I have ever heard. The mixtures extend upward into the "forties" and the whole thing sticks together without a single note protruding — a unit blaze of harmonics. The church has a five second reverberation. The organ is magnificently placed, though strange to say, it is tuned almost a whole note above 440A, and these higher harmonics have the effect of increasing intensity without diminishing sweetness. They are just right. I heard no old work as good. The modern top-drawer builders are men of the highest integrity — devoted to their art, willing to take the time to approximate perfection.

Now, let's get down to fundamentals. What *is* the Dutch organ — how do the Dutch go about things?

1. They put the organ right out in the open. The old builders did this, and the new men follow suit. This is basic to success. They know no such thing as "chamber."
2. Resonance chambers are built around each division.
3. They use the bar and slider chest — nothing else. When I mentioned the pneumatic-valve-to-a-pipe chest, a leading builder ejaculated, "Oh, *that's* no good." (That's his opinion!)
4. Tracker action — or as they say — "mechanical" action, is used even for four-manual organs. This is of course the fastest of any type, from key to valve. The touch is light, though the depth on the different manuals varies, about 3/8", more or less.
5. The two best builders install a "winker" inside the barred chest, and their wind is as steady as a rock. They cannot employ valve tremulants. (Purists take note!)
6. Very low wind pressures — from 50 to 80 millimeters (about 2" to 3").

7. Flue pipes wide open at the foot — full diameter of foot. All regulation at the flue.
8. No nicks — or as few and as light as possible.
9. Not more than one swell box, and in most instances, not even one.
10. Simplest possible couplers and pistons. Registration requires a helper.
11. Principal flue chorus of modest scaling. Fourniture and Cymbal thinner and louder than the 8′-4′-2′ ranks. (Very smart!) Twelfths fluty and big.
12. Flutes reverse the Diapason scaling, so the 8′ register is weakest, 4′ larger and fatter, and 2′ largest and fattest. Flutes mostly stopped — and not very different.
13. Mutations bold. Sesquialteras (12-17) enormous. Cornets abundant, and good. The best modern men admit the difficulty of getting them "right" and state that it takes much work to do so. They know the value of the 19th.
14. Scherp Mixtures thin and high pitched — usually unison-fifth composition.
15. No strings. (They will, if pressed, include them "So *you* can play César Franck"!)
16. None of the stops could be called really loud, and none really soft, by our standards, although they do vary to some extent.
17. Pedal 16′ flues weak, although I found some slight exceptions in organs by unknown builders. Usually the 16′ Pedal flue is not much louder than a Bourdon.
18. They make 32′ reeds, but of half-length, which contain practically no true 32′ tone, and clatter like a stick on a picket fence. The 16's have little character — you realize a "reed" has been added, but it is mild.

19. The Baroque 8′ reeds are wonderfully interesting and useful — excellent solo voices and color material for anything to which they are added. Many of them are beautifully finished and regulated.
20. "Chiff" — transient tones in initial speech — in the best work is extremely slight. Cheaper work exaggerates it.
21. The Hauptwerk (Great) diapason choruses are normal and good, but Positivs tend to be very thin and bitter. The farther North one goes the truer this is.
22. Finally, these *old* Dutch and North German organs are often nothing unusual or outstanding; just big organs, loaded with mixtures (in a degree American work can hardly aspire to), placed out in the open, in big reverberant churches. There is nothing magic or uncopyable about them. They were made by ordinary men along ordinary lines, and often by *very* ordinary men. Many of the famous organs are well-scaled, with good low-middle-high balance; and some of the registers are lovely (though I heard only a few such). I cannot go overboard or be enthusiastic, as some do. The same organs, less favorably placed in less favorable churches, would quickly show up in their true colors — good, but not too good.

The weak 16′ flue Pedal is adequate for polyphony — sometimes more than adequate — for a rather obscure reason: some of the "lines" in polyphony are 2′ high or more, in which case 8′ Pedal is acceptable (not necessarily right — but acceptable). The Continental system of increasing the scale and fundamental quality and power of flutes as their basic pitches rise (4's bigger than 8's, 2's bigger than 4's) can mean that although an 8′ flute is drawn, 8′-4′-2′ *sounds* like 2′. (I think this has something to do with the modern fad of playing things an "oc-

tave higher.") So a 16′ Pedal would be too deep and too remote. This high-pitched "jingly" stuff forms an abnormally large part of Continental programs. It can get deadly boring and tiresome — I have listened to it through three-fourths of an entire recital. It "gets by" with a decidedly light 16′ Pedal — the lighter the better. When they play full Great plus full Positiv, the 16′ flue Pedals are inaudible — not just inadequate. The Pedal reeds are not sufficient to balance ensemble.

It is literally impossible for the North Continental school — with all stops about the same power level — to achieve our dynamic range or climax. Our reeds completely eclipse theirs. Our Pedal dignity separates our work from theirs. But remember, in fairness — their ideals and ours are not the same.

In order to pin down some of these observations, it might be a good idea to digress and quote a few notes made at various "spots," to show how these principles work out in practice.

1. Tonight I heard two manuals of the unfinished four-manual organ in _____ Church. Organist plays well and understands registration. These people play nothing but Bach and pre-Bach. There are no swell boxes. Tracker action and barred chests. Positiv can be coupled 8′ to Great, and Swell also 8′ to Great. Positiv has 8′ coupler to Pedal. The Great and Pedal chorus reeds are not in yet; so all I heard was flue chorus, flutes and mutations. There are no strings, and no really soft stops. The flue Pedal 16's (Diapason and Bourdon) are too light — the *tout ensemble*, as a result, lacks majesty. There is no trace of the dignity of an English Great plus Pedal. Diapason chorus on Great and Positiv — superb! VI-rank Fourniture, IV-rank Cymbal and IV-rank Mixture on Positiv. The mixture scaling is on the smallish side and pipes are blown pretty close to capacity. The fifths are big. The 8′-4′-2′ flutes — lovely. Cornets very fine —

he uses a 4′ Chimney Flute for his Cornets. Church has between four and five seconds. Everything sounds clear and fresh. But *all* I heard during the evening was the same old ringing of "changes" on the 8′, 4′, 2-2/3′, 2′, 1-1/3′, 1′, the flutes 8′ and 2′, and 8′, 2′, 1-1/3′, etc., and full chorus. In full organ the treble is too weak and I could not hear more than a trace of a trill in right hand against left hand on the same manual. The general flue chorus is golden rather than silvery, and will of course be more so when the reeds are in. You cannot play Franck, Mozart, Mendelssohn, Karg-Elert, or modern music — but you can play French Baroque, as well as pre-1750 German music. I fail to see how even a Bach Chorale with not one tiny diminuendo can be as beautiful or expressive as it could with a few "hints" of such. This flue-work is much better than the new work I heard in Cologne and Strasbourg, being free from their coarse, harsh quality. It seems a pity to make an organ as large and expensive as this that will not play romantic music. It cost about $250 per register, and the quality of chests and pipes is "grade A" throughout.

I used to believe this "automatic manual-pedal-balance" story, and it sounds plausible — only it just isn't so. Their 16′ Pedal flues are altogether too weak.

The organ is just ordinary — though carefully done over. Hugh church, 232′ x 162′ x 60′ high, reverberates three seconds. Voicing is fair, mixtures smaller than usual. Scharff an octave higher than the Fourniture. Terzian very prominent. Sesquialtera bigger than a 12-17 held on the 8′ Gedeckt and 8′ Quintadena. Mutations quite bold. Reeds fair. Pedal 16′ reed good, medium power, prompt attack, but nondescript timbre (I suppose that is a compliment). Pedal flues light. They don't want, *or like*, body. They

continually seek mutation synthetics, harsh, strange, colorings. The organist came in and practiced. Nearly everything he played had at least one line in it dominated by 2′ stops — or higher. It grew awfully monotonous: 2-2/3′, 2′, 1-1/3′, 1′, etc. Like bells tinkling—or ice in a glass. Manual reeds fairly even and quite solid. There is a colossal (scale) Rohrfloete 8′ dating from the 16th century — just fair quality, no more than that. Good scheme, bold mutations, fine location, good church — but just a fair organ.

4. Swiss organ in Münster, Berne. Heard organist practicing — plays well. Church has four to five seconds. Very good flue chorus, good mutations and superb French-type Pedal reeds, 16′-8′-4′ — almost as good as Paris. Later got to try it myself. Organ sounds far better down the church than close up to the stops at the console. Here, many of the voices lacked character; just ordinary stuff. One stop, a Grossfloete, is poor. The Swiss do better in their choice of Pedal reed timbre and power than the Dutch and North Germans, though their flue chorus-work is not nearly as fine.

5. I sat, wrapped in my overcoat, by the side of the organist in the New Church, Amsterdam — one of the largest and most famous churches and organs in Holland — while he wrestled (and I mean wrestled) with the stops and manual and pedal keys. After two pages of a Bach prelude, he paused, took his handkerchief from his pocket and wiped the great beads of sweat from his forehead. The stopknobs are big brass balls screwed to big brass rods that lead back to the slides. They have to be yanked on and off by main strength. When two manuals were coupled he could barely do a short trill (I tried to trill, and couldn't). He didn't trill with his fingers — he rocked his hand (the new 1955

mechanical actions are easy to trill with three manuals coupled — I have proved this). But for centuries the old actions have been considered good enough and have been praised with a degree of chauvinism hard to associate with an otherwise hardheaded, sensible race. The Pedal keys of the old organs were often played by lifting the foot about three inches above them and stamping on them — like killing a bug.

6. The enthusiasm of the German-Dutch protagonists of Baroque organs and music is immense. Most of these men have never been outside their own countries. They have not the slightest idea of what is going on in other lands — nor have they any wish to know. They're not interested — they are completely satisfied with what they have. I was talking with a young Dutch organist — a nice boy, polite, earnest, so young, so wrapped up in his work. He said (about the terrible touch of his instrument with manuals coupled), "That's what makes a man an organist." A word about their straight Pedal-boards. These North Europeans have a different Pedal technique from ours. They slide all over the bench from side to side, and hop up and down like jumping-jacks. They don't feel at home on a concave or radiating Pedal-board where the spaces between the naturals get narrower toward the back.

The lamentable indifference of organists of the several European countries to the tonal pattern of organs in any land but their own is based on the radically different uses to which organs are put in the various countries. The Briton, whose choir accompaniment in the Church of England service is as far removed from the Greek chorus effects of the French Grand-Orgue as Piccadilly is from Picardy, is simply not concerned with any instrument foreign to his purpose. I asked perhaps the ablest

romantic player in England if he had been in Holland — just one night's journey distant — and knew the Dutch organs. He replied, "No, why should I go there?"

The Frenchman, whose knowledge (and understanding) of English organs is usually limited, asks, "What should I be doing with four or five unison diapasons?"

The Dutch-North German school, which thinks (and says) it does just two things with an organ (accompany congregational singing and play polyphony), looks with polite horror on the English concept and with tolerant pity on the French — "just too romantic!" I had that said to me all over Northern Europe. This damns anything — for the Dutch.

The harsh ferocity of the Central German modern work (as distinguished from that in North and South Germany) has a mitigating virtue in the practically perfect power balance of its manuals and pedals — its high, middle and low.

The weakness of the French system is in its thin upper octaves; the strength, in its magnificent rich and powerful basses. The weakness of the Dutch concept is its light and inconsequential basses; its strength, the scintillating splendor of its diapason middle and treble. It all reminds me of the Stockholm soprano I heard in "La Boheme." Years had caught up with her — she was a bit thick in the middle for Mimi — but she made up for it: her voice was thin at the top.

Does it not seem reasonable that America, so interested in every tonal system, is in the best position to improve?

Exorcism

Before we leave Europe there is a pair of ghosts that ought to be laid — a pair that has haunted the Baroque *Campo Santo* for years; and though you may not believe in ghosts, I can

assure you that many organ fans do, even to the extent of asserting their belief in print.

The first of these is the belief among many amateurs that pipes sharing a common bar over a common pallet valve in a slider chest interact sympathetically via the pipe feet, and "blend" better than when blown by individual valves.

I can see how pitch, but not timbre, could be so affected. It is asking too much of credulity to favor the fancy that vibrations of produced harmonics can be linked through separate pipe feet, and survive the eddies, turbulences and inequalities of pressure under every languid, as well as the extraneous noises associated with the mechanics of speech.

Let us assume, for the sake of argument, that the 2′ C's of several registers standing on the same bar with a common air well beneath them do so interact and mysteriously blend to better advantage. How about the C-sharp's and the F's? They cannot possibly "blend" with the C's. (Are we to be reduced to playing with one finger?) And as for imagining that voices of one division could blend with those of another — Swell with Great — any better than two different notes could — this is unthinkable!

By the same token, consider the predicament of the symphony orchestra. George, who blows the French Horn, is a rotund Roman Catholic with a barrel chest. John, who is seated at some distance from him (with various impedimenta such as fellow musicians, music racks, etc., between them), exhales into the Clarinet — he is a cadaverous Presbyterian of limited lung capacity and consequent rapid respiration. In view of the futility of hoping for any vestige of sympathetic inter-air communication between such disparate characters, might it not be wise to provide a common gas chamber in which the artists

could be confined (with their horns sticking out into the atmosphere, of course) so that this esoteric marriage of harmonics so vital to true blend might be consummated? Yes — it might — only that isn't what I should do with the gas chamber.

The other wraith is the idea that a tracker action (key mechanically connected with the pallet valve) permits a legato touch and speech-attack, as well as normal touch and time for tonal growth. In justice to this belief, experienced slide chest voicers say that they can actually tell if a flue pipe is "quick" or "slow" by the "feel" of the key. But that is not quite the same thing. Mr. Donald Harrison has neatly pointed out that when the air "pluck" (between the valve and its seat) is broken, the valve automatically opens wide, and certainly no finger pressure on the top of a manual key can delay its downward progress. Only, he states, if the key were held with the finger and thumb could such a gradual or legato attack be produced (and modern playing seldom permits of this technique). Well, I'll go further than that and say that you can grasp the key with the thumb and several fingers and lower it as slowly as the motion of the hour hand of a watch, but when the sensitive spot is reached where the "pluck" is even minutely broken, the valve slams down far enough to admit full ingress of chest air, and the pipe speaks its full, mature, prompt note.

Only when there is something wrong with the valve's adjustment can preliminary "flat" winding and speech be effected. I found one such note on a new Dutch organ and told the builder of it. He at once made a memorandum to fix it.

And yet one continually meets young — and not so young — Continental organists who assert that the tracker action gives them "actual contact with the organ."

So does the bench!

CHAPTER 9

The American Organ of the Middle Twentieth Century

THE ORGAN of this period is such a heterogeneous thing that it is almost impossible to generalize on it. Since we have no state church in America, the diversity of practices in worship have precluded the development of a standard of service playing. Each denomination goes its own way. Consequently there has been very tardy standardization or grasp of how to go about standardizing the American organ. The country is so huge, distances so great, conditions so different in different localities, that it is miraculous that organs and organ playing have improved so greatly in the past twenty-five years. We now have young virtuosi by the dozen (though the same scarcity of genius as always) who can play with astonishing style. We have been educated by the great amount of concertizing done by many fine players — foreign and domestic. It is now nothing unusual for a New York organist to make a week's tour by air of the Pacific Coast and be back home for Sunday service! All this gives the provincial organist a world-view. No longer is he marooned, isolated, insulated from top-grade playing.

A few men set opinion. The so-called Baroque clique is gradually becoming a bit less numerous and less vocal. Extremes of a few years ago are being curbed. The pendulum is just beginning to swing the other way. Basic design, more than anything else, has been neglected and misunderstood. Voicing has been brought by a few leading firms to a state of high polish. Work in that line today will stand comparison with the best of the past. In a general way I should venture the opinion that

today's American work is the most catholic and enlightened extant. It tends to the composite, which we regard as a virtue, and it has borrowed liberally from all good sources.

Two or three firms are in the lead with a great deal of mediocre and poor work trailing them. The second-raters are a bit foggy as to what it is all about, but they do an honest, though uninspired job of voicing and scaling. The poor builders fail on all counts, giving evidence that they do not know the A-B-C's of the art. But they are, perhaps, the most prodigious advertisers of all, and appear to be prosperous. This brings to mind the diner who asked the waiter: "Is this fish fresh?" "Can't you tell, sir?" "No." "Then what difference does it make?" My personal feeling is that they ought to be liquidated by some violent means, for they do nothing but evil; but unfortunately not enough organists and customers have agreed with me to make it safe to arrange this. So we struggle on, hoping that some day, not too remote, the public will be educated to a point where it *can* tell — and the fish will *have* to be fresh.

The pitman, universal and slider chests are all represented. Even tracker actions are advocated by a few men. Low wind with initial "chiff" (transient attack sound) is highly regarded in several quarters, and Baroque reeds with no more substance than strings have their admirers. A very large — too large — percentage of players vote against what has, even in classic days, been considered adequate unison diapason weight. Manual flue doubles are in eclipse, and manual reed doubles are looked upon as ridiculous by many. A great number of organists play an octave higher than the music is written. They seek "transparent clarity," they say.

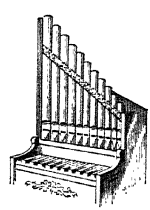
In other words, the same old merry-go-round is still going around. It is a healthy sign. At least we are not standing still. And out of this whirling current of enthusiasms and ideas (not

necessarily the same thing) a placidity of judgment is gradually being reached — it would almost seem that we are getting some place. We are beginning to realize that basic principles are unchanging and that most of our mistakes come from failure to know (and obey) a few simple facts. We err not so much in detail as in principle. But these structural laws are so buried under the surface of tonal planning that many of us have not even known they exist. Now, many times "burned," we are at last shy, and the more knowledgeable are getting on solid ground by studying them.

From what I have heard of the best work in England, France, Holland, Denmark, and Germany, I should say that we are making in the United States today, organs that, *on the average,* lead the world. In mechanisms they excel the Old World product so far as to make comparison unfair. But the encouraging, the really encouraging thing, is that we are at last coming to a more agreeable sound of full organ and sections — a genuinely *musical* sound based on extended harmonic series. It is neither too thin nor too fat — a good, fair, middle-of-the-road compromise.

PART II

A MINIMUM, ALL-PURPOSE AMERICAN ORGAN



A MINIMUM SPECIFICATION

Great (unenclosed)

a Violone (pedal) 16′
a Diapason 8′
a Octave 4′
a Twelfth 2-2/3′
a Fifteenth 2′
a Mixture (19-22-26) III
s Diapason Conique 8′ } in Choir Box
s Harmonic Flute 8′ }
s Quintadena 4′ }

Choir-Positiv (enclosed)

p Bourdon 8′
Salicional 8′
Salicional Céleste 8′
p Nachthorn 4′
p Oktav 2′
p Zymbel (26-29-33) III
Krummhorn 8′
Bombarde (Pedal) 8′

Swell (enclosed)

w Viola 8′
Voix Céleste 8′
w Hohlfloete 8′
Dolce 8′
Dolce Céleste 8′
w Prestant 4′
c Chimney Flute 4′
c Nasard 2-2/3′
c Flautino 2′
c Tierce 1-3/5′
w Mixture (15-19-22) III
Clarinet 16′
Clarinet (from 16′) 8′
Trumpet 8′
Clarion 4′

Pedal

Diapason (24 wood, 32 metal) 16′-8′-4′
x Violone (44 pipes) 16′-8′
Gedeckt (Choir plus 12 pipes) 16′-8′
Contra Dolce (Swell plus 12 pipes) 16′
Nachthorn (Choir) 4′
x Mixture (96 pipes) (17-19-22) III
Bombarde (56 pipes) 16′-8′-4′
Clarinet (Swell) 16′
Trumpet (Swell) 8′

a = Primary flue-chorus
s = Secondary Great-chorus
w = Swell flue-chorus
c = Cornet
p = Positiv-chorus
x = Pedal for polyphony

The relatively large Swell in this arrangement was originally influenced by the organ's being divided, with Great-Choir on one side of the chancel and Swell on the other. However, this disposition permits the Cornet to be played against the Positiv.

CHAPTER 1

Some Preliminary Generalities

WE BEGIN OUR THESIS with a statement of our ideal concept. We continue with a summary of its acoustic fitness and the multiple details of its ingredients, together with their source, original purpose, adaptation to present use, and, above all, incorporation into unity. Our aim is to design the smallest organ that will adequately play any classic organ literature, properly accompany a dignified church service, congregational singing, mixed or boy choirs, facilitate transcription and improvisation. We will not be content with the circumscribed dynamic or color limits of some nationalized or specialized systems. We will include the grandest, most dramatic of organ effects, the softest, most reverent organ tone; and, in between these power boundaries, the utmost in flexibility, blend and contrast, with a very elaborately articulated high, low and middle pitch balance. We will have genuine and practical automatic manual-pedal balance in the various power strata. Our scheme will rise above its components.

It will be conceived as inseparable from its acoustic partner, the church in which it sounds, with every detail of basic timbre, bass-treble balance, dependent on that marriage. I was about to say that we start with the chest as the basis of correct tone. But as a matter of fact, we start with the church, for if it is acoustically wrong or inadequate, nothing we can do will cure the disease, and the organ will die on our hands. The best we can hope for, then, is to do our best, considering the handicap. There will be no masterpiece — for that we need Nature's cooperation.

Every stop is glorified by reverberation, every voice is bound to other voices by reverberation, every tonal unit joins into a total unit. Every individual in a reverberant church joins into a congregation. When he sings in such a church, he is one of many, merging into all. When he sings in a dead church, he is an isolated, lonely unit, separated from his fellow men, wrapped in a blanket of insulation. Insulated from participation in song and in spirit. The "dead church" — never a truer word.

Practical reverberation is a matter of degree. Clean articulation of not too rapid speech will be heard and understood if the period does not exceed two and a half seconds in the empty building. The low limit of musical tolerance is one and a half seconds — empty. Below that, with congregation seated, the period will be cut to one second or less, at which point benefits are about nil. When we calculate a period "empty," we should allow for the reduction the congregation inevitably brings about. Suppose a church measures 150′ x 50′ x 50′ high. Such a room will seat, roughly, a thousand. If the ceiling is flat, it will contain 7500 square feet. If arched, or gabled, more. Let us say, for the sake of argument, that the average person, seated, exposes 10 square feet of clothing and flesh — excellent absorbents of sound. (10 square feet is, in fact, a minimum.) A thousand such people will contribute 10,000 square feet of absorbent material — even more effective stuff than the usual commercial products made for the purpose. In other words, a congregation can absorb more than the ceiling — even if the latter is sheathed in acoustic "what-not." Now if the ceiling is so treated, and *then* the congregation marches in, the room is doubly insulated against reverberation and in nearly every such instance, there will be none whatsoever. (The higher the ceiling, the less this will obtain.)

The average American church is smaller than the example just quoted. If it has the usual amount of glass, no pew cushions, a wooden ceiling with ordinary beams, no carpet except runners in the aisles, and the walls are ordinary plaster — neither exceptionally porous nor reflecting — the period of reverberation will usually be not more than two seconds. A stone or tile floor can raise this estimate, but as a rule there is nothing to fear in the way of excessive reverberation and no need for extensive acoustic treatment to avoid it. With congregation seated, a good speaker will be readily understood any place in the church. The moderate reverberation, with seats occupied, will help diffuse sound. There will be few if any "dead spots," such as are common in dead rooms. The usual "dead spot" in rectangular churches is about twenty feet in front of the rear wall. The reason for this is fairly simple.

The speaker stands, we shall say, twenty feet in front of the front wall — in front of the altar. His voice, like all sound, proceeds spherically. Some of it goes directly to the listener, some hits the rear wall and is reflected back to the listener. If the speaker is twenty feet from the front wall and the listener is twenty feet from the rear wall, the interval between the several impulses received by the listener is enough to blur speech. Do not let anyone claim that there is anything wrong with such a room; it is merely behaving normally. The remedy is a canopy or reflector over the pulpit or lectern to prevent some of these impulses. Experience in testing hundreds of churches all over this country and abroad, of every possible shape and material, forms the basis for these conclusions. They will answer the usual claims put forth by dispensers of acoustic stuffs that "speech will not be clear, etc., etc.," *ad infinitum, ad nauseam.* The advantages of reverberation for all music are too numerous to need further explanation or defense.

The position of the organ is vital. Whether it be in West-end gallery, transept, or chancel, the main requirement is that the entire front of the organ should be as open and unblocked as possible. If grilles have to be used, the percentage of opening should be at least 75%, and 90% is always desirable.

Functional plantation of chests and pipes is more and more specified today. This means that the chests and pipes, in their normal unadorned condition, can be arranged in pleasing designs and take the place of the conventional "casework." This has everything to recommend it. It guarantees free speech of the pipes and can prove an architectural opportunity for beautifying the church. It will be found that good voicing shines to the utmost advantage in such placement, and overtones, usually buried and inaudible, will ornament the voices — not barely, but greatly.

The church should understand, when it draws its plans, that dividing the organ adds substantially to its cost, and rarely enhances musical results. It is always better to have the organ in one place, with tonal emission unblocked. This costs less and sounds better.

The position of the console is another detail that demands careful thought. The main consideration is that the organist hear the organ and choir in balance and also be able to see the choir, and the choir the organist. The choir must hear the organ adequately to stay in pitch and time. Perhaps the best place for the console, in a divided chancel organ installation, is to the right of the altar (as you face the altar) with the organist facing the congregation; so that he can direct with his right hand.

As for the organ spaces themselves: if "chambers" are provided, they should be wide and shallow, with the entire front open. A narrow, deep, "hole in the wall" affair is of

course inefficient. Coved ceilings, or the equivalent, are helpful in throwing the tone out into the church, and the surfaces of the chamber walls should be hard and reflecting. There should be completely adequate insulation against tonal leakage and temperature change. All outside walls should be especially heavily insulated. The best place for the organ is right out in the church — no chambers at all. If the architect has forgotten to provide chambers, the church should pay him a bonus. But if such organ "tombs" are unfortunately supplied, it is well to install the unenclosed manual portions and pedal out in front of the chamber front wall in what, for want of a better name, we can call "window boxes." These should stretch completely across the tone opening so that the chests can stand within their width. I once won this position for a proposed "buried" organ by asking the minister if he would prefer delivering his sermons from the pulpit or a closet. If a divided installation is demanded, an opposite window-box is attractive, but not essential. It is not too desirable to make the two pipe-displays symmetrical. A little asymmetry asserts the genuineness of the functional parts.

There is some talk at the moment as to the desirability of having the tonal emission at different levels. The idea seems to have originated in Denmark. I can see how a Rückpositiv hung from the front edge of a gallery, close down to the congregation, can have a different effect from the higher and more remote other manual divisions. The character of the Rückpositiv stresses brittle, fresh, tangy tone. The closer one gets to any tone, the fresher it is bound to seem, for the high partials that make it so need every assistance in their job of reaching the listener. But *proximity* seems to play a greater part than altitude in its effect on timbre. I note that the London Festival Hall organ is all on one level and stretches a tremendous dis-

tance across the front of the hall. Too far for cohesion, I would judge.

As fine placements as any are those of the old Alexandra Palace organ in London and the Salt Lake City Tabernacle organ. They both sit out in the room, with nothing between them and the audience. An uniquely effective (tone and appearance) position distinguishes the organ in the Church of St. Bonaventure in Lyons, France. There the organ is in two sections, each complete with Gothic case. These stand in the Chancel, at either side of the altar, running from front to back, with the axis of the Chancel. Wonderful emission, beautiful appearance. The standard West-end gallery location found in most Roman Catholic churches is perhaps the best of all for tone, but it is not found as often in the Protestant churches. A transept location has its advantages in that it is closer to the center of the church, and where reverberation is excessive, this is desirable. Many English churches have their organs there — Newcastle Cathedral, St. Bartholomew's at Armley, and St. Bee's — to name three. One could summarize by stating that reverberation and an open position are primary essentials to success.

The next essential is the chest, which we have covered in Chapter Two. The gist of this is that the chest should permit optimum blowing of the pipe without blowing over to a preliminary octave partial — the "gulp." No chest that does not permit this optimum winding can claim first quality, or deny that it prevents first grade tone. Tempering the wind to the shorn pipe standing on such a chest is the basis of white, cold tone. (Take off wind at the foot and the pipe loses harmonics — indisputable!) The complaint of voicers and finishers that the pitman chest with its too-fast valve action slows up speech is

incorrect in one respect, though true in the main. What they should admit is that unless the pipe is slowed up appreciably, it will gulp. Their statement that expansion boxes improve speed of speech is likewise wrong. What they really mean is that expansion boxes permit the pipes being voiced less "slow" without blowing over. Put on expansion boxes and the pipes can be quickened. The builder with the wrong chest is indeed unfortunate.

CHAPTER 2

The Major Chorus-work

THE FIRST TONAL INGREDIENT to be considered is the diapason chorus in which the mixtures stress the unison, rather than the off-unison ranks, and the resultant tone is silvery, without a hint of reedy brassiness.

Our minimum scheme will not allow reeds in the Great, so the flue chorus will have to carry the full load of Great weight. The true Schulze is too violent a type of diapason for average church use, and a modified version is preferable. In a reverberant building of ordinary size (and this medium-sized organ should not be specified for extremely large buildings) scale 44 ($2\frac{1}{8}''$ diameter at 2′ C) will be adequate for the Great #1 Unison. The cut-up can be varied according to the period of reverberation with a higher cut-up used as reverberation decreases. If there is a two-second period, the 18th note halving ratio of diameters suitably provides smaller basses and larger trebles, working with Nature. If reverberation period is one second or less, the 17th note halving ratio is better, resulting in larger basses and smaller trebles, again working with Nature.[1] For very large buildings larger scales can be used; and even where moderate scales are specified, extra-large trebles are indicated — irregular treble "bulges." Some experts recommend 17th note halving to treble C and as much as 21st note

1. If the diameter of 2′ C is constant, and the ratios of halving for two stops are, respectively, 17th and 18th notes, it will be clear that 17th ratio basses will be larger and trebles smaller, while 18th ratio diameters will be smaller in the bass and larger in the treble, by about two notes at extremes. They diverge by about two notes in every thirty-four note gamut.

halving above that. That was Arthur Harrison's prescription for cathedral work. By the same token, many cathedral Pedal Bourdons are smaller scaled than we find necessary in smallish carpeted churches, so positively does this teamwork of scaling and acoustics work.

My own experience is that the 18th note ratio is best for general purposes. If special diapason trebles — wide scales — are used, cut-ups are of course reduced so that the wider mouths deliver power and the lower mouths keep the timbre bright. All these various and changing factors are matters of custom-built fitting to the room, but they all follow the law that reverberation fattens, non-reverberation thins all tone, whether chorus member, single stop or single pipe. Obviously this is no task for the beginner or the commercial builder whose advertising makes claims for quality but whose work shows ignorance of how to get quality.

Mouth-widths of 2/7 of the circumference are to be avoided on higher than 3½″ wind. This is because the chest-valve pressure impulse is less violent and peaked with low pressure, and the top edge of the impulse is therefore "flatter" and strikes clear across the wide mouth sufficiently instantaneously to give our faulty ears the impression of precise speech. Quarter mouths are better for general use. Cut-ups of from 27% to 30% of mouth-widths are sensible. They fit most conditions. As chest pressure varies, foot-holes must be regulated for size so that the all-important pressure-within-the-pipe-foot will not be excessive. Chest pressure is a deceptive condition, misleading to the layman. What really counts is the pressure at the lip — the flue, the only place the real business is transacted. Low chest pressure helps faster equalization within the pipe foot, under the languid, and is especially good for pipes in the 8′ and 4′ octaves, though not nearly so helpful to voicing above

2′ C. In fact, 4½″ is one of the best all-purpose chest pressures. It does not hurt the flue-work and it does help the reeds. If separate flue and reed pressures are not practicable, or are too expensive, requiring as they do, separate regulators, 4½″ will be found to permit first grade tonal work in all departments. I know a three-manual in a church with one second reverberation that I call "the best argument for 4½″ wind I ever heard." I defy anyone to find fault with that flue or reed voicing, or to point out where lower wind would help the flues. This moot subject of wind pressure gets a great deal of loose talk, and one should be very careful to know exactly what he is talking about before he talks at all. The attitude of the professional voicer is far more tolerant than that of the usual "fan" or amateur.

Quarter (25%) cut-up of mouth width is as bad as a full "third" in many cases. We are not seeking extremes of brilliant or mellow tone, but a middle-of-the-road compromise; and 30% delivers this. The pipes must be fitted to the chest attack, bubble plus octave; bubble alone; or bubble plus (with difficulty) the octave; and no mistake made as to which is which for the particular chest. Foot-hole for middle C of Great #1 Diapason Unison will, on 4½″ chest pressure, average ⅜″ diameter. That will approximate optimum blowing.

If the room verges on using full capacity of our organ, the 4′ Octave can be one scale smaller than the Unison. In ordinary rooms it is better to make it two scales smaller than the Unison — according to the size of the room and its reverberation period. But the Twelfth should be not less than two scales smaller than the Fifteenth (each fifth sounding rank two scales smaller than the next higher unison rank) and the Father Willis prescription for minor flue chorus-work was four scales smaller! If you seek silver, that is the way to get it. If you want brass, exaggerate the fifths.

In mixture work, the silver concept (the classic "argentine tone") depends on this subordination of the off-unison ranks. This can be achieved by smaller off-unison scales, smaller foot-holes in equal scales, higher cut-ups with equal blowing, deeper nicking — anything to make the off-unison ranks more fundamental and of less power. Narrower mouths are also standard practice.

The important matter of the scaling of the flue chorus double is dependent on the period of reverberation — almost more than any other chorus member. If the room is lively, it can be three or four notes smaller than the unison; if dead, two notes. This proportion will at once draw fire from the proponents of innocuous Quintatens as major-chorus doubles. But we are not concerned with that abnormal type of unbalanced chorus that ignores "double" weight, substitutes fifths for unisons, or in any way distorts the natural harmonic series. The weak Quintaten vogue is a faux pas contemporary with the current Baroque revival — though strange to say, neither North nor South German Baroque builders, and not even Danish builders, used Quintatens for other than *secondary* choruses! A real Great needs the dignity of a balanced double. At the risk of laboring the vital point: in a deadish room, low tones are less helped by reverberation and tend to sound weak, so we must provide them in more than average strength if we are to retain true balance.

Perhaps the best compromise type of flue chorus double is the Violone or Contra-Geigen. It correctly starts the progression of timbre-pitch, which follows the general law that low members are harmonically richest. Basses should be brighter than trebles, not only in chorus members, but basses of single stops. It works as logically in diapasons as in chorus reeds. The natural harmonic series demands it of thoughtful builders.

If the unison is scale 44, the double, according to acoustics and context, is scale 46 to 48 at CC and increases only every second note to 16′ C. Thus CCC is only six notes larger than CC, instead of the standard twelve. So treated, the register acts equally well as a manual double and as a Pedal intermediate voice. The special slimmer scaling of the 16′ octave injects a stringy quality which avoids manual thickness and insures pedal definition.

Though appearing on both manual and pedal, it is actually a genuinely independent pedal register, because it will never be used as a manual double in less than approximately full organ, when the Pedal Violone will be swallowed up in a Pedal equal to the job of manual balance. When not drawn on the manual, it is, in truth, a straight pedal stop. A peculiarity of this type of tone is that it may sound too loud at the console, but not in the church. String tone tends not to carry over distances.

This register forms one of the pillars of our scheme, being the main reliance of our so-called "automatic manual-pedal balance" (a phrase for which I am indebted to Robert Noehren). It provides a more definite, more musical tone than the Bourdon plus upper-work Pedal of antiquity, and enables us to out-do the early builders at their own game — polyphony. They never possessed anything comparable to a Violone, with its warm, crisp sound. The Contra-bass of the orchestra now finds a close parallel in the organ, in timbre and utility.

It is becoming obvious as we go along that *any successful minimum all-purpose organ must be based on compromises*, and that it is meritorious to capture traditional effects with simpler, less elaborate materials. The mixture-work of the major diapason chorus can therefore well extend no higher than the 26th. If the breaks are arranged judiciously, this will yield all the brilliance the average church needs, and it will top off a weighty

chorus, too. The composition of the 19-22-26 mixture admits of some variety, according to the building and the service. It can break even to 8′ pitch well down the gamut, or it can do without 8′ pitch entirely. If the church is large and deadish, the break to 8′ tone is possibly advisable. It will put mass where acoustics tends to take it out. In a larger, reverberant church the 8′ tone in the mixture is unnecessary. It can then stop at 4′.

If we were to follow in stereotyped order the development of the usual stop-list, the Swell would come up for discussion next, or even the Great secondary flue-work. But working downward, from the integer to detail, we must next take up the major reed — the major manual reed. What color shall it be, and what power? Is it possible to have it right in both qualities if we extend it upward from a balanced Pedal reed? Yes, it is, and the great money saving will not be unwelcome. The requirement is that it be of the same general timbre as the rest of the full organ up to that point. What we seek in employing it as a super chorus reed, as well as the rarely provided solo antiphonal voice, is a final splash of brilliance and power that will extend *forte* to *fortissimo* without changing the general color except by brightening it.

This double use dictates less power than a genuine English Tuba would have. The ratio sought is one that will add something like 25% to what has gone before; that last final surge of crescendo that marks the true climax. The organ that does not have it is second-rate, just as is the athlete who lacks the final surge of power. It marks the difference between the runner-up and the champion. It is a state of mind, and those who do not miss it are to be pitied. It cannot be left out of ideal form anymore than the third act of a play.

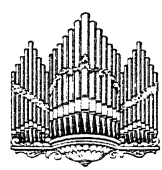
If this extension of the Pedal register has this fortunate manual effect, how does the voice fit into the Pedal field and function? The answer is — in the best possible way. For the correct register is a French Bombarde, playable at 16′, 8′, and 4′ on Pedal and at 8′ on Choir. Thus it is in, but not of, that section. There is nothing so dramatically and forcefully effective as this type of tone for *forte-fortissimo* Pedal. In an organ such as we plan, which will prove to need 33 to 35 registers, it should always be enclosed, making it much more useful and applicable to various demands. The Bombarde is so superior to the more fundamental Trombone that there can be no hesitation in choosing between them. Added to the Pedal flue-work, it imparts a drama and a decisive edge that a weightier reed cannot equal, again demonstrating the "rich bass" principle. Played solo against full manual-flues it realizes an effect the English organ cannot manage — a magnificence of intensity rather than substance. Both the manual-pedal Violone and the manual-pedal Bombarde are compromise registers, and not an iota of suitability to double duties has been sacrificed.

We now have a major unenclosed Great flue chorus and an enclosed major reed, the latter playable on manual-pedal, acting as a climax both to divisions and to full organ, and addable gradually with maximum utility. These two elements form the spine of our *tout ensemble.* They provide the main contrast. Each is uncontaminated by the other. They are true colors, and make possible the blue-yellow-green mentioned earlier.

Now, at the bottom of our power strata, we provide a tapered Dolce and its Céleste rank. They are so soft that with the shades closed they retreat into near-inaudibility. The tapered flavor characterizing them is more interesting and reverent

than that of a wood flute céleste. This soft pair is indispensable in many parts of the church service but finds quasi-blends with the *mp* strings of the Choir — to come later.

We have defined the upper and lower power limits of our scheme.



CHAPTER 3

The Middle of the Tonal "Sandwich"

THE INTERMEDIATE VOICES amount to about 70% of the stop-list and are all of similar power or "audibility" — which is a term we must invent to cover voices that, though of varying weight, suggest perhaps, by greater or less intensity, similar power. They consist of the secondary voices of the Great, the bulk of the Swell, and with the exception of the 8′ Bombarde, the entire Choir. They comprise diapason, flute, string and reed tone. They all balance very well with the Pedal Violone at 16′ and 8′, which will be discussed later, plus the Pedal Mixture. In some cases better balance is afforded by the Pedal 16′ and 8′ Gedeckt plus the 16′ Contra Dolce (also to be discussed later), but in any case manual-work has no difficulty in finding a ready pedal balance — without manual to pedal coupling.

By now we can see that our concept assumes the shape of an *mp-mf* "sandwich" with the intermediate voices forming the filling between an "upper-crust" of powerful diapason-reed tone and a lower one of Dolces. These upper and lower dynamic strata are beyond the boundaries of early Continental organs and provide effects and results beyond the scope of Schnitger and similar instruments.

It is apparent that great color variety is available in the intermediate powers most used in general playing, where it will do the most good and make results most interesting to player and listener. It will later become equally apparent that this color variety springs from three sources: colorful individual

voices, wide pitch differences, and almost complete blendability of unison and off-unison stops.

Within each section the scaling is similar, so that *intra-sectional blend* is axiomatic. But each section is characterized by different basic scaling (one wide, another slender) so that *inter-sectional contrast* is equally inevitable. Each section is founded on and dominated by a different basic pitch; this further heightens contrast. Let us first consider the Great, Swell and Choir choruses of this middle layer.

The Great secondary flue-work consists of the Diapason Conique 8′, Harmonic Flute 8′ and Quintadena 4′, all enclosed with the Choir stops. This is the most fundamental of the intermediate manual-choruses. It earns the title "chorus" because the 4′ Quintadena acts as a tiny mixture of 4′ and 1-1/3′ (8-19) and when the three stops are super-coupled, the effect is convincingly accentuated. Being enclosed, it can be matched in power against contrasting groups or added in correct proportion to companions in blend.

The Swell flue chorus is a study in economy. Its 8′ member is a compound stop, the Viola plus the Hohlfloete, which voices are so carefully scaled, balanced and harmonically developed that they more than *suggest* diapason timbre — a Cavaillé-Coll trick. They are topped by a 4′ Prestant that sets the pitch for the group, and by a 15-19-22 Mixture in which the unison ranks are four notes larger than the fifths. This 8′-4′ Mixture combination, by reason of its strong 4′ pitch and heavily accented unisons, takes on a silvery quality that is very beautiful, and its total power, enclosed, is easily matched against other sections. In fact, it is little dependent on the expression shades for this and is about "right" just as it is.

The third manual flue chorus of *mf* power — intensity, audibility — is that of the Choir, and it is pared down to bare

essentials. It consists of a metal Bourdon 8′, an *mp* Salicional 8′ and its Céleste, a 4′ Nachthorn, a rather dominating 2′ Oktav and a 26-29-33 Zymbel. Omitting the Céleste, we have 8′-4′-2′-Mixture-tone of genuine Positiv character. The scales are smaller, the general timbre (due largely to the Oktav, and Zymbel with prominent off-unison ranks) is more intense than the other manual groups, yet, strangely, the audibility is about equal. In polyphony it holds its own with Great and Swell groups.

Consider the characters of these three little ensembles. The Great has weight and only a suggestion of upper-work, yet enough to give it interesting sparkle. The Swell has less weight, more 4′ power, and a low-pitched, silvery mixture. The Choir has still less weight, but considerably more accent on the 2′ pitch and the high, pungent mixture. The three are as different as red, white and blue.

From the three of them almost any musical demand can be met. They cover the range from sober to sprightly. Add the Swell to the Great and then the Choir to the two, and we achieve a crescendo telling in power and brilliance, for *unlikes add up.* Pitch diversification is the sure way to *suggested* power; pitch similarity, the certain path to lifeless monotony.

A large proportion of classic organ literature is polyphonic. Clarity in polyphony depends on dissimilarity of the several "lines." Many confuse polyphonic clarity with clarity of general organ tone, meaning, essentially, crisp, thin timbre. The two clarities have no connection whatsoever. If all the "lines" are crisp, the polyphony will be obscure. An organ can, theoretically at least, be very "dark" and still provide excellent polyphonic clarity.

It is not difficult to register polyphonic music as some arrangers transcribe organ polyphony for the orchestra. They

orchestrate the lines on different instruments so that no matter where they wander they stay distinct. In like fashion it is possible for the organist to assign the parts to flute, string, reed, and so capture "clarity." But that is not the authentic, organistic way of going about it, and it does not materialize the authentic organ effect. Only if the lines can be carried by different choruses does one hear the organ as it really is, and as the music was meant to sound. The subtle and complicated contrasts of harmonic structure that are indigenous to the organ are beyond the power of the orchestra, which has to "cheat." That is why an orchestral transcription of, say, the D Minor Toccata and Fugue is, at best, a thin parody and a real example of (forgive the pun) *lèse majesté.*

But it is not so simple in planning an organ efficiently to differentiate and *balance* secondary chorus-work. The process is likely to be too expensive. It may call for extraneous stops that find rare employment in some types of organ music. It may mean the duplication of certain pitches — which costs money. It may not fit into a concept that does justice to Franck or Mendelssohn, etc. Our concept is a whole, not a loose collection of details, and the stop that helps to clarify polyphony may have to serve as an accompanimental register in a Mozart organ-string sonata!

So we are further convinced and forced to realize that the one solution to this problem is a pattern of compromise, of protean versatility, and the choice and placement of obliging voices that will interlock into an integer of design, and yet perform radically different duties equally well. This sort of designing is as far removed from ordinary commercial "stop-listing" as calculus is from the multiplication table. It even smacks of a sort of "calculistic" flavor. It is not for the beginner or the enthusiastic amateur, or even the garden-variety builder,

all of whom will have as much success at this kind of organ design as they would at turning out a good jet engine. A sufficiently unnebulous materialization emerges only after a lifetime of study and cut-and-try, of changing this and that, of going up one blind alley after another. Every great builder has changed as he grew older, confessing to dissatisfaction, reaching for the unreachable, capturing physical perfection of voicing technique but missing, perhaps, the inner principle of compromise and individual stop "casting."

Cavaillé-Coll exemplified this changeability. He widened the boundaries of organ tone and expressiveness. As we have said, it would be hard to believe — it *is* hard to believe — that the man who built the organ at the Madeleine also built the ones at Nôtre Dame and St. Sulpice. His very breadth of vision fostered this proneness to change. The German and the Danish builders, with their constancy of devotion to the Baroque concept, their limited view, have painted in miniature; Cavaillé-Coll spread his canvas across the tonal sky.

Father Willis changed, and changed again. Within the limits of his conception no one ever did better work. His faults were less of commission than of omission. He pioneered a national school of design too actively to have time for an international view. We profit from the past. We pick up the pieces dropped by better men and arrange them into a bigger pattern. They created; we compile, and in so doing, also create, perhaps moving on into new dimensions.

Further examples of protean registers are the 2′ Flute of the Swell, which acts as a top for the flutes and strings and also takes its accurately fitted place in the Cornet; the Choir Bourdon 8′, which is mated to the strings and Nachthorn in a condensed version of an "American" Choir; it adds to its accompanimental

duty that of forming the "double" of the Positiv chorus. The Nachthorn is not only a beautiful 4′ Flute, but also the 4′ link in the Positiv, where it does a far better job than seems likely on paper; the 16′ Clarinet of the Swell constitutes a properly light, rich double for the Trumpet chorus and also makes possible a new kind of chorus: a "reedless" reed chorus that has the richest tone in the organ.[1] An 8′ unison Clarinet extension is a helper in this and is an indispensable color for interpreting Franck. It is a fortunate fact that the very type of Clarinet that does best for the reed chorus also does best for Franck. A weak voice would be useless; the robust stop is what is wanted in both cases.

1. The composition of this chorus is 16′ and 8′ Clarinet, 4′ Prestant, Mixture, and Swell to Swell 4′ coupler.

CHAPTER 4

The Reeds and Special Voices

WE HAVE yet to take up the Swell reeds, particularly as they are balanced within their own chorus and as they are related in timbre and power to the Choir Bombarde. Opinion in some quarters has been against dominating reed, "Tuba" tone. But, like other fads and trends, this sort of timid thing comes and goes, and recently we hear more and more of such climactic reeds, especially in large organs. But the large organ is not the only one that needs such a register. The middle-sized scheme, such as we are concerned with, simply cannot do without one — and stay in balance. It is essential not only for what the stop itself contributes, but also for what it makes possible in subordinate stops — a sort of indirect protean function.

If there is no Choir Bombarde, the burden of manual reed power falls on the Swell Trumpets, which then have to furnish enough power for balance in full organ. In other words, the Swell Trumpets are not pitted against the Swell flues only, but against full Great as well. Obviously, if they are equal to this demand, they are too big for the Swell! The gap between the Swell flues and the Swell Trumpets in such a case is not tolerable within a section. It makes an organ which is difficult to handle. It does what *it* wants to do, not what *you* want it to do. And yet 95% of the middle-sized three-manual organs built in this country within the past ten years or so have not contained the one register that would have avoided this unpardonable defect, this jumpy, unmanageable build-up. When the reed burden is divided with the Choir Bombarde, the Swell Trumpets

can be softer and take their place in a gradual Swell crescendo. The gap that separates them from the Swell flues becomes narrow, and the utility of the Trumpets is very much enhanced. In this build-up the Clarion enters before the unison. It comes in with less of a "bump."

The two-stage reed crescendo is all the more thrilling because unexpected. After the usual Swell reed addition, which will always tell to a certain extent in any scheme, comes the magnificent surge of the Bombarde to top off full organ. It lifts the organ into another dimension.

Our Swell Trumpets therefore are of medium scale and blown to optimum timbre. This timbre is, properly, darker than that of the Bombarde, so that the crescendo can obey the law that as power increases, brilliance increases with it. For this reason, in an organ equipped with a Choir Bombarde, it is not wise for the Swell to forecast the final brilliance. Choice of genuine *Trompette* tone is therefore incorrect. It is proof of the soundness of our conception that the Bombarde, if right for the final splash, is exactly right for major Pedal duty, or to invert that statement — it works in either direction. It will be seen in this tightly dovetailed system that timbre of one stop dictates that of another.

The proper Clarinet is not too suave. At 16′, serving as the Trumpet chorus double, it must be very rich harmonically to be right. It can become slightly less brilliant as it reaches into the upper octaves. The unison Trumpet is almost half again as loud and a trifle darker. The Clarion should be slightly darker still, and a bit softer than the unison reed. This arrangement can be defended against any argument. It follows the natural law that the lower tones must be richer harmonically.

Within the structure of the Swell is the Cornet. The regular 4′ Chimney Flute that complements the Swell Hohlfloete also

serves as the 4′ member of the Cornet. The 2′ Flute (Flautino) has already been described. The Nasard and Tierce can be used separately, as well as collectively in the Cornet. The Hohlfloete functions as the 8′ member. There will be objections to this component's being open instead of stopped. Tradition is all on the side of a stopped Flute unison in the Cornet. This seems odd when the Nasard, Flautino and Tierce are all open. Open tone is good enough for the finest mutations it is possible to make, so why should a Cornet unison be different from its higher companions? Certainly open tone coheres better than stopped, and the 4′ Prestant makes an even more convincing member than the 4′ Chimney Flute, yielding a Cornet with more snarl and solidity. Because of similarity in scale and power, our arrangement gives us this option. The proof of the pudding is that the Cornet sounds solid and balanced with the open unison. This archaic register is an essential in any scheme that pretends to catholic ability. A great deal of seventeenth and eighteenth-century music cannot be played authentically without a Cornet.

The strings of the Swell, in such a composite scheme as ours, should be excellent blenders — have all-round utility; therefore they must be of a large scale. The more slender a string the less blendable and useful it necessarily becomes. We have no room for individualists in our tightly packed and intricately organized instrument. Violas fill the requirements; 52 scale is good. They can be parallel or tapered, with the blend advantage lying with the latter type. They are hardly smaller than a Geigen. They are voiced as "rosiny" as the scale will permit, and regulated to good power so as to fuse with the unison flute and assist in the build-up prior to the entrance of the reeds. We can see that these multiple duties preclude the use of slender strings. It will be equally clear that if a Geigen

were to be added to the Swell, the strings could then be of smaller scale, something like 56.

The Choir strings can, however, in contrast, be of smaller scale than those of the Swell and they should occupy a position in the build-up half-way between the Dolces and the Violas. There is a certain amount of leeway in the choice of timbre but very little in the choice of power. If the Swell has a Geigen and 56 scale Gambes, then the Choir strings can well be 52 scale tapered Violas of intermediate power — in fact, this latter apportionment works out especially beautifully. Let us call them by the traditional English term of Salicionals.

The one manual stop still to be selected is the Choir 8′ reed. We already have Clarinet, Trumpet and Bombarde timbres — what shall this Choir reed be? A Petite Trompette will not do, for it would be only a miniature of the Bombarde. An English Horn is fairly acceptable as being a new color. A moderately soft example of the Bassoon or Oboe could be considered. There is also a capped Oboe fitted with French parallel shallots called a Fagot, that has been tried with some success. But the Krummhorn, as a chorus as well as a solo reed, has too much character to leave out; it gets the vote. There are all sorts of Krummhorns, bland to brilliant. The right one is just a hair to the bright side. It is a true Baroque pigment, and nothing replaces it. This soft Choir reed is probably the first stop that could be deleted from the scheme; yet we need some solo variety as well as a filler for the "Positiv."

First of all, we must remind ourselves, this is a church organ, intended to play romantic as well as classic music. There is no duty more romantic than the proper accompaniment of the church service, and a scheme that leaves out romantic voices is too cold for the job. That is why we have three célestes, *pp*, *mp*, and *mf*. We want, on occasion, to be able to build up a

sensuously rich, vibrant body of tone, and although some may disagree, it is difficult to see how it can be done as satisfactorily with stops other than célestes. The church congregation pays for the organ. It will hardly consist of a uniformly high level of music critics — but it is entitled to be pleased with what its money has paid for, and the short-sighted organist who refuses to give it what it likes and demands had better rent, rather than buy a home, for he will probably move on — and soon. There are few jobs calling for more tact and judgment than that of church organist, and a stiff-necked attitude is foolish.

Then there are transcriptions — and transcriptions. I do not remember ever being more thrilled than by the late Wallace Sabin's improvisations and transcriptions. He was the greatest improviser of his time, not excluding the Frenchmen. Such glorious use of color; such logical, undulating, unhurried, progressive crescendo to climax; such melodic invention; such utter avoidance of the banal — these qualities set him apart. But — he *had* to have color! There are always thousands of good executants who shrivel when they try to improvise. They have less use for romantic voices. As César Franck said of the pupil with the small hands: "It is unfortunate." But at least we can provide the color; and hope the future provides the genius.

CHAPTER 5

The Pedal

WITH AN OVER-ALL VIEW of the manuals, granting that the Great is based on 8′ tone, the Swell (properly) on 4′, and the Choir-Positiv on 2′, the Pedal ought to be founded on 16′ tone. Those lean and hungry minds that delete 8′ weight from the Great would probably have to argue that the Pedal should be based on 8′ tone (though I note they draw heavily on 16's and 32's, thus skipping an octave in their harmonic series, to their 4′ Greats). The 8′ tone of the Great cannot be weakened without injury to the ensemble. The organ is not a hodge-podge of dissociated sections. Its tone should be (as any good tone has to be) a continuous harmonic series, from bottom to top. Weak links in a chain are notoriously fatal; a broken harmonic series is equally so. The only way to treat the various tonal divisions is to consider them as parts of the tonal army, giving each a quality and a duty disciplined to the whole.

We hear of the French basing their major manual on the 16′ harmonic series. If they do this, they must base their Pédale on the 32′, and that is perfectly correct — if they have the materials for such a program. By the same token, our normal 8′ Greats need a 16′ Pedal. The point is made clear by reversing this; our 16′ Pedals need an 8′ Great!

Now the question remains: what strength shall the Pedal be, relative to that of the Great? I see no reason why an integrated harmonic chain should countenance the 8′ members of these two sections differing appreciably in power. That guides us in setting the power of the 16's. I also see no reason why

we should abandon our principle that deeper tone should be brighter. The day never dawned that saw a Bourdon comparable in beauty to a Violone. We hear reverent words about the "soft dark tone" of Dutch Pedals; my comment would be irreverent. The Pedal should be firm, as any foundation should. The secondary Pedal can be soft, but not the primary.

So now we come to this primary Pedal register, usually called "Diapason." It is correctly supplied in 16′, 8′ and 4′ pitches — plus mixture-work. It is usually played one note at a time, and as used here, it is of *forte* power, too big for usual polyphony. The classic builders provided manual-to-pedal couplers, which they considered it less than criminal to use. I never yet have heard a Pedal section that such couplers would not aid. The Pedal "Diapason" can consist of three independent 16′, 8′ and 4′ ranks, or of a unit set of 56 pipes playable at the three pitches, or what seems to have the call at this writing — an independent 16′ set and a unified 8′-4′ set. The hairsplitting for which the public is paying in this matter of extended versus independent major flue-work of the Pedal needs a little examination. Just how much difference is there in the sounds of these several alternates? We are concerned with what we can hear, not just with what we can read. At once we must qualify our question, for no two companies balance the 16′, 8′ and 4′ independent ranks the same way. More than that, no one company seems to balance them the same way twice — not on organs that I have tried. If there were a certain, fixed, approved, superlative way of arranging the powers and timbres of these three pitches, there could then be some legitimate argument in favor of independent ranks that would justify the excessive cost. But until this standard is so certified, the whole thing remains a matter of personal judgment and taste.

Some firms make the 32 pipes of the 16′ Diapason of wood. Some break to metal — at various notes! Some combine an all-wood 32 pipe 16′ rank with an independent metal 8′ and an independent metal 4′. Some make the 8′ louder than the 4′. Some have the 4′ louder than the 8′. The independent 16′ plus the unified metal 8′-4′ is a compromise that can't completely miss — that can't be too far wrong. Many blindly trust it.

The 56 pipe unit set has 24 medium-scale, wood, bearded pipes and 32 metal diapason pipes which can all be regulated to approximate fairly closely the octave-by-octave power balances of three normal independent sets. The general character is crisp, rather than full, consistent with the bright-bass full-top (pedal-manual) timbre progression. The power is similar to that of the Great First Unison, which is the really important item, but the quality is firmer. When both Great and Pedal flue choruses are drawn, we have on the Great an impressive aggregation of various unisons and fifths, moving here and there; and below, on the Pedal, is our unit stop at 16′-8′-4′ plus Mixture (another group of unisons and off-unisons) moving contrariwise to or in conjunction with the manual work; we are supposed to be able to tell, in this grand, *forte mêlée*, if the Pedal is unified, independent, or half and half — or if the 4′ is a scale larger and louder than the 8′ — though which 8′ and which 4′ is not certain — or if the extended Pedal 8′ is two scales smaller than the Pedal 16′!

The cost of the unit rank of 56 pipes playable at 16′, 8′ and 4′ is about two-thirds that of the independent ranks. For the difference one can, with a few dollars, pay for the III-rank Pedal Mixture. Now who would rather have an independent 16′, 8′ and 4′, three separate ranks, than a unit 16′-8′-4′ register and a III-rank 96 pipe Mixture? Even a beginner can tell the answer here.

The *mêlée*, with manual-to-pedal couplers becomes truly terrific. But there are quite vocal people who assert they can still hear an independent Pedal and are quite willing to spend the other fellow's money to buy it. I once asked Arthur Harrison if *he* could tell — in John Compton's extended flue-chorus — if the fifths were clear (independent) or tempered (borrowed). "Oh, yes," he replied, "with the help of considerable imagination I could." I wonder how vocal some people would be in Mr. Harrison's presence. Our minimum scheme has no Pedal Bourdon. It is the first voice we can do without. It is the least musical of all organ tones.

The Violone of 44 pipes builds dynamically to the Diapason. It is a genuine independent Pedal register when it is not drawn on the Great as a Double. When, in this latter case, full Pedal would also likely be drawn and the Pedal Violone largely swallowed up by the louder Pedal stops, there is nothing wrong in its manual-pedal duplication. The Gedeckt is extended from the Choir 8′ Bourdon and is playable at 16′ and 8′. The 4′ is borrowed from the Choir, a fairly bold voice. The Contra Dolce is extended from the Swell 8′ Dolce. The 17-19-22 Mixture is balanced to the 16′ and 8′ Violone, and is not a "full Pedal" register. The Bombarde is a 56 pipe unit, playable at 16′, 8′ and 4′. It is supplemented by the Clarinet borrowed at 16′ and the Swell Trumpet borrowed at 8′.

The Contra Dolce and the Gedeckt combined produce a strength almost equal to that of the average Bourdon, and their combined timbres are infinitely more musical. The delicate Contra Dolce makes a better bass to strings than any Gedeckt could, being more definite and sympathetic. The surprise in this Pedal section is the usefulness of the 16′ Clarinet. Combined with the Violone, it produces a crisp, reedy bass that is beautiful in quality and intermediate in power. The Pedal build-up is more

gradual than appears on paper, largely because of this multi-purpose Clarinet and the way it fits in.

Following our principle of putting color where it is heard most often, in order to make a colorful organ, the 17-19-22 Mixture, not more than *mf* in power, is fitted to the Violone 16′-8′. (If objection is made to the third-sounding rank, composition can be 15-19-22.) This combination of Violone-Mixture gives us our automatic manual-pedal balance for polyphony. The combination matches the great bulk of the manual work without further fiddling or help — you just draw them and they "work." And what a beautiful sound! Down the church the Violone turns to velvet, but it is a firm velvet. And this Violone, by the way, is "Haskellized."[1] The CCC pipe stands easily in 10′6″ height, without mitering. This is interesting to the builder for its economy in space, both in the organ and in shipping — and more interesting to the listener in timbre. The Haskell pipe has been neglected too long. Patents on this pipe expired years ago, and anyone can use it. I knew Will Haskell well — a great man, who would not lend himself to inferior thinking. His pipe gets better with depth of pitch and excels in string tone. It makes a wonderful 32′. Not long ago I had the opportunity to compare a full length Violone CCC with a Haskell CCC pipe, and in prompt speech, beautiful edge and depth — every quality that makes a Violone a Violone — the Haskell was better than the standard pipe, so much so that no ear would have to listen twice to tell. Our simplicity of Pedal equipment for the bulk

1. About 1900, William E. Haskell invented and patented his celebrated short length pipe in which a capped pipe was inserted in an open pipe, lowering the pitch substantially.

I am grateful to Dr. Karl Geiringer for permission to cite from his "The Bach Family" that in 1706, Nicholaus Bach, cousin of Johann Sebastian Bach, invented a device similar in form and purpose.

Truly, there is nothing new under the sun!

of *mf* playing parallels the ideal Baroque plan, only it does the work better.

Summarizing — we have four 16′ flues, three 8′ flues, two 4′ flues and a III-rank Mixture. These range from *mp* to *f*. The Bombarde, when added to the flues, dominates them and is almost adequate to Pedal balance alone. In fact, one of the finest effects in an organ, full manual flue-work with a pure "reed" Pedal, is managed by our Bombarde with ease. The Clarinet 16′ and Trumpet 8′ have many Baroque and modern uses. Fifteen Pedal stops, all told.

DERIVATIONS OR ORIGINS OF VARIOUS FEATURES

Great Major Diapason Chorus:	Modern English (modified Schulze-Lewis).
Major Reed (Bombarde):	Modified French.
Swell Flue Chorus:	Father Willis treatment with exaggerated unisons.
MP Flues:	American. Tapered, narrow mouths, quick voicing.
MF Middle Ground:	General German-Dutch practice with elaborate secondary flue chorus-work of contrasting pitch and color, yet same "audibility."
Automatic Manual-Pedal Balance:	After the North German fashion, in which one Pedal group satisfies all or any secondary manual work.
Swell Reed Chorus:	French-English — the double Clarinet and strong unison Clarinet derived from the same source. Trumpet English. Father Willis plan of color progression from more foundational Swell to bright climactic Bombarde.
Mutations:	Cliquot pattern; wide-scaled flutes voiced as strings with light or no nicking. Good power, firm.
Harmonic Flute, Chimney Flute:	Father Willis scales.
Strings:	Contemporary American treatment.
4′ Quintadena:	A most successful innovation; the most colorful and useful of 4′ flues.
Bourdon 8′, Nachthorn 4′:	Continental treatment with light nicks and some transient attack sound.
Zymbel and 2′ Oktav:	German Baroque.
Pedal Diapason:	Current American treatment.
Pedal Bombarde:	CCC 7″ diameter. Modified French shallots. Maximum power and harmonic trebles.

CHAPTER 6

A Few Loose Ends and Summary

THE AVERAGE CRITICISM of any organ is too likely to be based on generalities — vague, casual. Undoubtedly there are organs so inferior that we can label them with one short hearing. We are not interested in these. We are concerned only with those that exhibit at least surface quality.

It is strangely true that most organists are unwilling, insufficiently interested, or unable to examine an instrument in the systematic way necessary to real appraisal. They praise or condemn on such grounds as single stops or special items. One hears such remarks as: "I like those diapasons"; "the organ sounded very good"(!!!); "why doesn't he use a stopped flute in the Swell?"; "the strings are too broad," etc. That's not criticism, that's just gossip. Of course the individual stops in a good organ ought to have beauty and charm, and full organ a grand sound, but the vital question is: *"What will it do?"*

That question takes time and thought to answer. Are we willing to make the effort that this demands? If we are, only then can a real examination begin. Then the sub-surface designing (if any) that is worked into the plan stands or falls; exists or does not exist. The secondary flue-work shows up either as organized groups or as isolated voices; with or without definite purpose, position, and duty, both in sections and in full organ. The time will shortly come, I hope, when this evaluation will be familiar to every organist, for it is the shrewdest, most searching, and most subtle of any.

The well-planned organ is hard to exhaust. The organist continues to discover new combinations after months of playing — because the musical combinations are almost as numerous as the mathematical ones. Startingly different types of ensembles are to be had: a French sound, like a Frenchman playing a French organ; an English cathedral sound, like St. Paul's or Westminster Abbey; German Baroque sound with Schnitger or Silbermann implications; and American sound, romantic. All this, with convincing character, derived from one short stop-list!

Does this appear unlikely, or impossible? I can assure the reader that it *is* possible, and it has been done — and every day enhances the soundness with which it has been done. Every time these organs are played by different men, new individuality is disclosed. A Baroque specialist, either French or German, finds himself thoroughly at home, and registration easy. Modern French music can be registered to yield the authentic French sound. "Praise, my soul, the King of heaven" never rolled down the aisles of St. Mary, Redcliffe, more convincingly "British" than we can roll it on such a scheme. Liszt's "B-A-C-H" comes to life in thrilling dynamics such as a pianist would employ. In a service, the silence following prayer is broken by the almost inaudible reverence of the Dolces. The trio sonatas of Bach find every stop and chorus necessary to perfect rendition. For Franck, the indispensable Clarinet and strings are at hand. The Diapason Conique almost improves on Silbermann tone. Try to think of some type of organ music that this American design will not play adequately! Some good men have already tried, and failed. The more they play the scheme, the deeper do they get into it, with the registrational possibilities becoming increasingly apparent.

Pertinent to this protean ability is a letter from Dr. Albert Schweitzer: "Since 1896 I have endeavored to find out from

his pupils just how the master (Franck) played his own works." He went on to say that, for his recording of the E Major Chorale on the Ste. Aurelie, Strasbourg, organ, he began with twelve 8′ flues and the 8′ Clarinet. I know that organ fairly well. Its unison flues are very colorful and the Clarinet is bold — with a Trompette bass octave!

Looking up the old Ste. Clothilde specification in Wallace Goodrich's "The Organ in France," we find that the "master" had thirteen unison flues and the inevitable 8′ Clarinet. It seems a good guess that when Dr. Schweitzer supervised the rebuilding at Ste. Aurelie, changing the original Andreas Silbermann scheme radically, he followed the Ste. Clothilde "line." At any rate, he arranged things so that he could duplicate pretty well the authentic Franck treatment. So when we listen to the Chorale in E recorded by Dr. Schweitzer on the Ste. Aurelie organ, we can know this is Franck as Franck played it — and as it sounded to Franck.

Turning to our stop-list, we find eleven 8′ flues and the same robust 8′ Clarinet. The next time you play the Chorale, try adding the Clarinet to the usual registration and hear the authentic French sound materialize. Not only does our scheme provide a unison Clarinet, but this same register, at 16′, acts as a perfect double to the Swell reed chorus and in no way lets it down, although it is also a perfect stop for playing Franck. This is a sample of what our general aim has been, which one admits presents a challenge when extended throughout the organ.

A timely word about the matter of 8′ tone: so many of our younger men seek to avoid it today. They have a habit of building up the Great flue-work in what appears to me an inverted order. They will begin with soft unisons, then add the Octave, then the Fifteenth, Twelfth and Mixture; and then, with a cunning look, the unison diapason, saying: "See how it muddies

my ensemble." (The "my" is the best word in that sentence.) Then they take the unison off. Their favorite double is the 16′ Quintaten, which, as usually made, is heavily "fifth" and appropriately goes underneath this thin middle. If majesty is of the essence, this is a regency (the king is missing).

Unison tone should begin the Great primary flue build-up — unison diapason tone. Next comes the Octave, then the Fifteenth, Twelfth, Double, and finally the Mixture. Now, marvelous to relate, the unison does not stand apart from the chorus, but is the balancing middle of it. A piece can now be played where it is written, not an octave higher.

The unison-less, double-less flue "ensemble" seems to have been originated and propagandized by a few American organists posted in strategic places. It has no parallel abroad. It can be taken as a reaction against thick tone of the 1900-30 period, but no longer has it any just application. It is a hang-over from a cure of that disease, and it *also* needs to be cured. Being contrary to the laws of acoustics and physics, it cannot endure. A few years from now it will be laughed at. The tonal systems of all national schools of organ design revolve about normal 8′ tone. The best works, therefore, cannot realize their potentialities if played in this "octave higher" manner, omitting unison diapasons.

A Frenchman once wisely said: "The numbers on the stops are as important as the names." We must remember this and learn to register in harmonic series. Pitch is the material of any series. Pitch, in the final analysis, is even more important than timbre. Unfailingly interesting sounds flow from unbroken series, almost regardless of the timbre of the ingredients. Sub and super coupling of mixtures,[1] mutations, various 8′ and 4′

1. An exception is the major Mixture-work of the Great, which should not be super-coupled, assuming it is properly balanced in the first place.

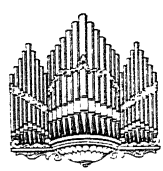
registers — employ them all and enter a new world of organ sound.

For example, to show how widely different individual colorings can be welded into something new and interesting, try such a combination as 8′ Clarinet, 4′ Flute, Nasard, Flautino and Tierce — *and sub coupler.* This yields tenor C 16′, two 8′s, a 5-1/3′, two 4′s, a 3-1/5′, a 2-2/3′, a 2′ and a 1-3/5′. In mixture symbols this is sub-1-1-5-8-8-10-12-15-17. Can you anticipate its sound? (You should learn to be able to do so with any combination.) It proves to be a "wood-wind" of extreme richness, with a somber, dark mood, suited to a portrayal of the ominous or the melancholic. Or take the Great 4′ Quintadena, Swell 8′ Flute, 4′ Octave and 15-19-22 Mixture, with Great sub and super couplers and Swell to Great unison and super couplers. This yields 1-1-8-8-8-15-15-15-19-22-22-26-29. Even allowing for changes in composition at the Mixture breaks, we can see that this is a complex galaxy of delicate unisons and fifths. The surprise is that the Quintadena and Mixture fifths join into a jingle like little silver bells, one of the most intriguing sounds imaginable. All it takes is a little imagination to figure out such combinations.

Or, if some badly balanced organ has a too-conspicuous Mixture, perhaps it is not the Mixture's fault at all, but a "dip" between the Unison and Mixture pitches that accents their separation. Try coupling down an Octave 4′ from another manual, or coupling up a unison Geigen — anything to put more 4′ weight into the hole between the Unison and the Mixture. You may then find the Mixture sounds just right. If there is no Geigen or Octave handy, try a firm flute. This line of thought, of course, works in both directions. One might have said the Unison was as conspicuous as the Mixture, with equal truth. There was a

gap in the series. It wasn't the Unison's fault anymore than that of the Mixture. In their "hate" of unisons, a lot of people seem to be able to see but one side of the argument. It is said that thinking is an association of ideas; we must have more than one idea in order to have something to associate with it. Take a good, broad look at the various factors before you place the blame. Otherwise you may only deceive yourself.

If this argument seems trite, let me assure you that there are hundreds of organs in this country where it can be justly applied — not old organs — *new* organs.



A SLIGHTLY LARGER ALTERNATE SCHEME

(This scheme employs the same general principles of design and is adapted to undivided installation — in one space.)

Great (unenclosed)

Violone (Pedal)	16′
Diapason	8′
Octave	4′
Twelfth	2-2/3′
Fifteenth	2′
Mixture (19-22-26-29)	IV
Diapason Conique	8′
Gemshorn	8′
Harmonic Flute	8′
Quintadena	4′

(Diapason Conique, Gemshorn, Harmonic Flute, Quintadena: in Choir Box)

Choir-Positiv (enclosed)

Bourdon	8′
Viola (tapered)	8′
Viola Céleste	8′
Octave	4′
Nachthorn or Koppelfloete	4′
Nasard	2-2/3′
Blockfloete	2′
Tierce	1-3/5′
Larigot	1-1/3′
Siffloete	1′
Zymbel (26-29-33)	III
Krummhorn	8′
Bombarde (Pedal or independent)	8′

Swell (enclosed)

Bourdon	16′
Geigen	8′
Hohlfloete	8′
Gambe	8′
Voix Céleste	8′
Dolce	8′
Dolce Céleste	8′
Prestant	4′
Chimney Flute	4′
Fifteenth	2′
Flageolet	2′
Mixture (12-19-22)	III
Clarinet	16′
Clarinet (from 16′)	8′
Trumpet	8′
Hautbois Clairon	4′

Note the substitution of smaller scaled, more pungent Swell strings since the addition of the Geigen. Also, that contrasting Choir strings are now large scale, but slightly tapered pipes.

Pedal

Diapason (24 wood, 32 metal)	16′-8′-4′
Violone (44 pipes)	16′-8′
Gedeckt (Swell Bourdon)	16′-8′
Bourdon (56 pipes)	16′-8′-4′
Contra Dolce (Swell plus 12 pipes)	16′
Mixture (96 pipes) (17-19-22)	III
Bombarde (56 pipes)	16′-8′-4′
Clarinet (Swell)	16′
Trumpet (Swell)	8′

The next step would be to specify a condensed unenclosed Positiv, redesigning the Choir-Positiv.

Choir (enclosed)	
Bourdon	8′
Viola	8′
Viola Céleste	8′
Nachthorn	4′
Nasard	2-2/3′
Blockfloete	2′
Tierce	1-3/5′
Siffloete	1′
Krummhorn	8′
Bombarde	8′

Positiv (unenclosed)	
Suavial	8′
Octave	4′
Octave	2′
Larigot	1-1/3′
Zymbel (26-29-33)	III

A FURTHER VARIANT

Great (unenclosed)	
Contra Spitzfloete	16′
Diapason	8′
Spitzfloete (from Double)	8′
Bourdon	8′
Octave	4′
Quintadena	4′
*Fourniture	IV
Rauschquint *mf* (12-15)	II

Choir-Positiv (enclosed)	
Nason Flute	8′
Geigen	8′
Dolce	8′
Unda Maris (Tenor C)	8′
Nachthorn	4′
Oktav	2′
Larigot (Tenor C)	1-1/3′
Zymbel (26-29-33)	III
Krummhorn	8′
Bombarde (Pedal)	8′

Swell (enclosed)	
Viola	8′
Voix Céleste (Tenor C)	8′
Hohlfloete	8′
Prestant	4′
Chimney Flute	4′
Nasard (Tenor C)	2-2/3′
Flageolet	2′
Tierce (Tenor C)	1-3/5′
Mixture (15-19-22)	III
Clarinet	16′
Clarinet (from Double)	8′
Trumpet	8′
Hautbois Clairon	4′

Pedal	
Diapason (56 metal)	16′-8′-4′
Spitzfloete (Great)	16′-8′
Lieblich Gedeckt (Wood and Metal 56 pipes)	16′-8′-4′
Mixture (64 pipes) (19-22)	II
Bombarde (56 pipes)	16′-8′-4′
Clarinet (Swell)	16′
Trumpet (Swell)	8′

Composition of Fourniture	
19-22-26-29	12 notes
15-19-22-26	12 "
12-15-19-22	12 "
8-12-15-19	12 "
1- 8-12-15	13 "

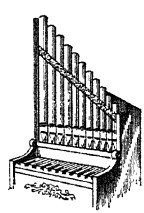
The 12th and 15th enter at middle C. The Rauschquint (balanced to secondary chorus) serves fairly well up to that point. This yields two harmonically satisfactory choruses, *ff* and *mf*.

The use of the metal Pedal Diapason is contingent on an open, unblocked position where its lesser weight will be adequate.

The Tenor C mutations are justified by their lesser cost and by the fact that rarely are such mutations used below Tenor C.

PART III

HOW TO TELL A GOOD ORGAN FROM A POOR ONE



CHAPTER I

Preliminary Survey

WE HAVE OUTLINED the basic principles and some details. How can we make use of them? How can we apply them in a direct test of an organ? Can we devise a series of easily remembered questions that will simplify the appraisal of essentials, when we ask them about an organ?

The initial approach is, naturally, acoustic. Is the church reverberant? Just what is "reverberant" or "non-reverberant"? Is the period of reverberation measured in the empty or in the occupied building? The fairest test, undoubtedly, would be made when the average congregation is present, but usually it can only be made in an empty building. The period, whether favorable or the reverse, is a matter of degree; so are all tonal adjustments to that degree. It is impossible to set any definite period as the dividing point that separates favorable from unfavorable acoustic influence. But for practical purposes we can lean on experience and say that if the church, empty or occupied, reverberates for about one and a half seconds, it is favorable to all sound. If it has less than that period, it is at best of doubtful help; and if it has less than one second, it becomes a definite problem for the organ builder.

There are, of course, churches that are completely dead, and others that are abnormally reverberant. Each requires special scaling, voicing, mixture composition, etc. But for the great middle ground of one to three seconds, the rule is that "deadish" rooms demand somewhat fundamental timbres with accent on basses and caution in the regulation of the trebles;

while in reverberant rooms, more brilliant basic tone is indicated, and trebles are stressed and basses slighted. The size of the room, of course, enters into all such calculations. Naturally it takes more power for a big room.

The period of reverberation is measured by striking an *mf* note or chord and timing its duration with a stopwatch. If no watch is available, one can count: "Zero, One, Two, etc.," *beginning with the release of the keys.* "Zero," when spoken deliberately, takes about one second. The right speed should be learned, for the application of this trick is endless. Do not count the last, lingering shadow of reverberation; it has no effect on timbre. Measure only the real, the readily audible duration. If 90% of the sound is gone in less than one second, then for our purpose the period is less than one second. In the average church, of average size and shape, a full congregation will usually cut the "empty" period in half. Of course this must be taken into consideration in all estimates. In an abnormally high, reverberant church the congregation has far less effect (more cubic content).

Nothing could be more misleading than to imagine that an organ heard in a reverberant church will sound that way in a "dead" or "deadish" one. The difference can be unbelievable. This is the commonest of all mistakes made by the usual committee or judge. This interpolation may be irrelevant, but it certainly is invaluable.

It would be a great help to the organist or judge, who is ordinarily uninformed as to scales, mouth-widths, cut-ups, nicking, pressures, etc. (all those voicing factors that control timbre and power), if he could reinforce his ear-judgment with such data; and if it were practicable to go into this sufficiently, we should do so. But it is too detailed a subject, and contingent

on too many influencing conditions. For the time being, the tersest way to put the matter is to state that an intelligent designer will always try to compensate for acoustic conditions, so as to produce a fairly uniform or standard type of ensemble — be the room "dead" or "alive." There are some things he cannot do, but he can make gestures in the right direction. He can always depend on Mother Nature to try her best to weaken basses and point up trebles in a dead room, and to do the opposite in a reverberant room. Perhaps a more accurate way to say this is that Nature penalizes trebles less than basses in non-reverberation. The first thing to look for, or listen for, in a "deadish" church is a weak Pedal and a thin top. The larger the church the more this will apply. In a reverberant church expect a powerful Pedal and a weaker top. Note also if the general timbre of the major flues is fundamental or brilliant.

In a "deadish" room listen to the composition of the mixtures of the Great flue chorus. If the breaks come well down the keyboard, the designer has put low-pitched ranks in the top octaves and thus tried to restore some of the treble mass that Nature has taken away. If, then, in this non-reverberant church the structural timbres lean to the fundamental, the Pedal sounds adequate, the top octaves full, not thin and shrill, score one for the designer; he is a thoughtful man who has started right.

But if, on the contrary, in this dead church, the general flue-work is brilliant, the Pedal light, the top conspicuous — distrust the party responsible, for his first steps have been wrong. Obviously if the first steps are wrong, the man doesn't know what he is doing. Be sure to dig — and find who is to blame.

This is a difficult, elusive subject to write about, for when we say the timbre "sounds" fundamental, we can depend on it (in non-reverberant rooms) that the timbre is really extra-fun-

damental. It cannot be lifted out of its surroundings and judged independently, but is a variable, dependent altogether on the surfaces that reflect it. We judge by what the sound is not! If the basic timbre in the dead room is *not* thin, we know the designer has begun correctly. If the dead room exhibits treble mass, we can be sure that it has been forced to do so against its will. If the Pedal is adequate, and all three of these factors of ensemble balance correct, it is more likely that the man back of the work is competent and we can trust him. But it must be repeated that all these corrections and adjustments can be overdone, and errors in this direction can betray deep ignorance of artistry, as conversely, can complete neglect of the problem.[1]

These straws in the wind give the student a "line" on the builder's ability. Look for them, always. Never swallow an organ whole (omitting examination of details). But never judge it by single stops, either; single voices do not make an organ. Keep in mind that the extreme integration demanded in first rate work requires that every register be companionable and cooperative — not a star player, but one of a team. It is probable that next to mistaking acoustic influence for actual timbre, the most frequent and flagrant error of judgment of organs is obsession with single stops. I have heard organists rave over a Pedal string and completely ignore a Great-Swell balance so absurd as to be pitiful. This myopic examination is indefensible. First, watch for the architectural principles, *then* examine the details.

1. Some rooms exhibit varying periods of reverberation at low, middle and high pitches. Tests made with 4′, 2′ and 1′ pipes can determine the degree of this. Scaling and regulation can also be varied to conform to results of tests. But scaling may well lead to complications difficult to analyze or defend, and regulation seems the better plan — adjusting the pipes on the job.

CHAPTER 2

Tests of Mixture-work

THE COMPOSITION of any mixture can be determined by duplicating the pitches of one note of the Mixture on a 4′ Principal of another manual. If, for instance, on this Principal, tenor C, the G above, and middle C match the pitches of the Mixture on low C, the Mixture composition is 15-19-22. If there is still another G and C, the composition is 15-19-22-26-29, etc. Let us assume that the Mixture pitches so duplicated prove it to be IV ranks (19-22-26-29). Compare this chord on the Principal with low C of the Mixture. Are the two alike in *timbre?* If they are, or very nearly so, we know (since the G's and C's of the Principal are presumably the same power) that the Mixture G's and C's are also alike in power.

Add such a mixture to the 16′-8′-4′-2′ Diapason chorus and note how "reedy" it becomes. One might almost say a small Trompette had been added to it. The way to get a brassy, reedy flue chorus is to scale and regulate the fifth sounding ranks of the mixtures the same power as the unison ranks. If you have already detected this reedy quality in the flue chorus, be sure to make the Mixture-Principal test. It will place the blame infallibly. It is, of course, clear that a contrast between such a reed-tinctured flue chorus and real reeds is minimized. During this testing, also try matching chords on the Twelfth and the Fifteenth. If they are of the same power, this is the "tip-off." It shows the designer prefers brassy flue-work and has voluntarily given up the efficiency of flue-reed contrast (and probably has had to provide a very fiery Swell Trompette group in order

to have something still brassier that will yield a noticeable contrast with the flues). Some firms have turned to this system as a reaction from their work of a few years ago, when they used far more fundamental reeds with the same reedy flues, and had a Great-Swell contrast that was very weak indeed. This is a further illustration of how one mistake pushes the designer into another. He plays his reed quality "ace" first and has nothing left for the crucial trick-climax of timbre.

Confirming all this is a phonograph record made a few years ago in which short flue-chorus passages are played antiphonally against trumpets. I was so pleased with this humoring of the organ's best paces that I wrote the recording organist and told him that although his diapasons were topless and full, I applauded the effort at contrast. The next time we met, he said: "I had to leave out the mixtures because they were so reedy they would have killed my contrast." Think of an 80-stop organ that did not dare to produce one unadulterated, mature diapason chorus! Then realize that this trouble all goes back to the perverted principle of exaggerated fifths — a declaration of mistaken faith, a tonal disease inherited from Germanic work that had no true chorus reeds and had to depend on synthetic reeds.

Realize that we are trying to pin down details of technique. We are, for the moment, less interested in results than in causes. We are not just listening to how the chorus *sounds*, we are finding out *how it is made*. Once we know that, it *has* to sound one definite way. We are removing the discussion from the field of taste and taking it into the field of fact, where there can be no argument.

CHAPTER 3

Fitting the Voicing to the Chest

NOW COMES ONE OF THE VITAL POINTS in any organ: is the major diapason work "quick" or "slow"? We mean by this — is it quick or slow *on the chest?* We check this chest behavior by blowing the pipes by mouth. If they gurgle ("bubble") and will not, even with heavy wind, blow over to any harmonic, they are definitely slow. If they blow the bubble, and with difficulty, the octave, they are medium slow. If they blow the bubble and easily blow over to the octave, they verge on quickness but are still within the boundary of good timbre. But if they blow the octave *without* the bubble they are definitely quick, and quick diapason tone is not top quality timbre. No good chest demands that a pipe be voiced really quick to give good attack and speech.

This blowing the pipe by mouth is the voicer's test and is not final, but it serves as a guide to his fitting the pipe's speech to the attack of the chest on which it is to stand. It can also serve as a guide to the organist or critic who wants to find out if the pipe is "right" for the particular chest concerned. Here are a few rules to follow that will tell him if the organ builder is competent:

First, ascertain what type of chest is provided — barred, pitman or universal. Then blow, by mouth, middle C of the major Diapason Unison.

If the chest is barred, the pipe should blow the bubble and, with light increase of pressure, the octave.

On a pitman chest, the pipe should blow the bubble but not the octave, even with heavy wind.

On a universal chest, the pipe should blow the bubble and, with difficulty, the octave.

But if on a barred chest the pipe is voiced as for a pitman (bubble without octave), it will be too slow for ordinary use. The quality will be good — rich, singing tone — but a tap of the key may not bring the prime at all.

If a pipe voiced for a pitman chest blows easily, by mouth, the octave in addition to the bubble, the pipe (on the chest) will first speak its octave and then settle on the prime (gulp).

If a pipe voiced on a universal chest blows, by mouth, the bubble without the octave, then the key-pipe response may be too slow for practical usage and the pipe will need quickening. If the pipe blows, by mouth, the octave too readily, it will gulp on the universal chest; but the same pipe will gulp more readily and audibly on a pitman chest.

But these highly complicated details are not easy ground for an amateur examining organ voicing and tone. They can lead to wrong conclusions and injustices. There is only one item I think ought to be covered. This is the so-called expansion box which is no more than an interposition of atmospheric air above the valve and below the pipe foot. Its invariable effect is to cushion the abruptness of the chest-wind attack by prolonging the time it takes for the pressure to build up. This lessening of the air-jolt reduces the chances of blowing over to the octave *and permits quickening the pipe.*

Regardless of all the printed expositions of such experiments, if they lead to any other verdict they are wrong and misleading, and I surely should not mention such at all unless they had appeared — under auspices that should have known the facts before accepting the responsibility of publication.

There is another angle to this matter of speech, concerned with the attack sound or transient-speech sound that, in view of the attention it is currently getting, can stand some ventilation. Writers on Dutch, Danish and North German organs dwell on the "vitality" of the chorus tone and generally attribute this to the slight percussive attack sound due to the omission of nicks. Listeners can hear this on many modern phonograph records. I have two critic-friends who tell me they never tire listening to such tone, whereas the average domestic organ gives "enough" after one hour. In every instance within my listening experience the stops with these edge-tones are flutes or fluty diapasons.

Flute timbre is underdeveloped harmonically, inevitably inferior in expressive capacity and intellectual interest. A diapason that gulps is fluty — and also inferior as an expressive medium. The critic who prefers this type of tone gives up the singing quality of slow-side (chest) timbre, with its extended series of harmonics, and accepts instead transient-attack tone super-imposed on white tone. That is that. We can skirt the edges of this impasse as long as we like, but we have to come back to the final criterion: there is no dodging the harsh truth that all the definitions of good timbre in voice, violin, piano — any musical sound — go counter to white tone.

Listen to a velvety-toned piano, and then to one with brilliant voicing. Dr. Schweitzer aptly says that the latter "blends much better with stringed instruments." Listen to each; each has the percussive attack and transient noise of hammer on string, but the after-tone of the velvety piano is a dull, lifeless thing compared with the rich sonority of the brilliant one. (Godowsky said to me: "I like a brilliant piano.") Dr. Andrews, that great Oberlin man and musician, as he played alternately on a Schulze-type diapason and a fundamental one, said:

"Hear how the rich one almost speaks the words, and how the other has nothing to say." The complex holds; the simple bores.

I believe that the men who favor the Baroque prompt-attack tone confuse the transient noise with richness. I believe that when they say how the average domestic organ tires them after a short time, they have in mind *inferior* domestic organs. They continue to set up that aged scarecrow of "thick modern" diapason tone. Now all modern diapasons are by no means thick. We can make just as good Schulze tone today as Schulze ever did. I have heard it — have had a hand in its making.

There is a richness to the Schnitger-Danish type of flue ensemble tone, but it is synthetic, not innate. It depends almost entirely on ranks of skilfully scaled and voiced *artificial* harmonics not on the *natural* harmonics of the structural ranks. Prompt speech forced quick timbre on Baroque diapason voicers, making it completely essential to stress and elaborate the mixture-work. Reeds were less than structural; their function was to supply the color the flues lacked.

If you like transient white tone better than the slightly less prompt rich tone of slower voicing, that is your prerogative, but at least recognize it for what it is. You may switch your judgment — in time.

There are innumerable violin concertos for every flute concerto (there are many times as many violins in a symphony orchestra as there are flutes). Music is written for expressive instruments, and white tone is not expressive, even when it has the pronounced initial spit of the orchestral flute — a far more virile sound than the "tuh" of any Baroque diapason.

There is no question that the unnicked, transient tone pipework of the Baroque period has an important place in the comprehensive modern organ. As a relief and contrast to the major

chorus-work it properly finds its place in the Positiv and in the mutations. (Remember that mutations do not constitute a Positiv.) More than an important, it has an essential, indispensable place in an all-purpose scheme. Its sprightly charm is a lovely effect; its aid to clarity is necessary to "period" music. But it is not proper major structural tone, any more than is any other quick tone.

The Silbermann Diapason is a partial exception to this classification. Although its upper lip is pulled forward, the languids are high enough to inject a certain amount of string quality, and the happy balance constitutes a most noble sound. It is a somber sound, and a reserved dignity is its signature, but it also has warmth.

CHAPTER 4

Great-Swell Perspective

THE NEXT GENERAL TEST is of the relative strengths of the Great and Swell sections. If the combination of Swell reeds and Great flues in a three-manual organ shows equal balance of these two basic components, then the organ is abnormal. For in such a case, the Swell reeds are not balanced to the Swell flues, but against full Great! It follows, logically, that the build-up from Swell flues to such Swell reeds crosses a gap too wide to be tolerated in any correct section.

Again we must remind ourselves that we are not discussing large organs, luxurious schemes anticipating all, or nearly all, contingencies. We are dealing instead with practical everyday instruments that most of the more prosperous churches can afford. If large organs fall by our tests, so much the worse for them; but arguments of sufficiency based on size are not pertinent. We are proposing constructive as well as destructive criticism.

The one correct answer to Great-Swell balance — the kind that makes an organ "willing and obliging" — is the Choir major chorus reed. When it is supplied, the jumpy build-up can be taken out of the Swell by reducing the scale and power of the Swell Trumpets to a point where the flue-reed gap is acceptable. Has the organ under consideration such a major reed?

I have recently seen examples of so-called first-grade organs — post World War II vintage — in which the individually fine Swell Trompettes were twice as powerful as full Great!

What kind of "designing" is that? Three-manual organs, costing upwards of $50,000, in which the A-B-C's are violated! Such unpardonable nonsense must be stopped. What is easier than to build up the Swell and measure the gap between its flue-work and the first chorus reed, then test the Swell reeds against the Great flues. The youngest amateur can do that, and nail down the facts.

While on this subject of Great-Swell perspective, there is another test that applies to many medium-sized two and three-manual organs in this country, and it is this: when there is but one mixture, shall it be in the Great or in the Swell? It has long been the custom to specify a Great extending up to Twelfth and Fifteenth and to locate the 15-19-22 (or similar) Mixture in the Swell. To do so results in an organ that is neither "fish, flesh nor fowl." The correct place for the Mixture is in the Great, as an extension of the diapason chorus harmonic series. In that way the organ delivers at least one legitimate, authentic effect — a real diapason chorus. As the diapason is the backbone of the organ, it gets the first consideration (over the reeds) for completion.

A diapason "chorus" that stops short at 12-15 is admittedly only a gesture in the right direction. Any 15-19-22 Mixture placed in the Swell that carries on in correct power to complete the Great chorus is, of course, too loud for the Swell. The reeds can do without a mixture a great deal better than can the curtailed Great flues.

Strange as it may look, it would be better to place the 15-19-22 Mixture in the Great and the Twelfth and Fifteenth in the Swell. The Mixture will break back to a twelfth above middle C in any case, and the independent Twelfth will not be missed in the Great.

Of course, such economy of money applied to economy of scheme cannot be argued against. There are times when the choice as to which section must be impoverished has to be made. But, all things considered, most fortunate (or least unfortunate) results follow giving the Mixture to the Diapason chorus, and judgment of a scheme should be based on this fact. Furthermore, I have never yet heard a Swell Mixture of the *proper quality* to carry on from a Great 12-15. Were it made to do so, it would be too large scale, thick and massive for collaboration with the Swell flues or reeds; it would be foreign to everything that the Swell stands for.

We occasionally still see—although this unbelievable blunder is rarer than it used to be — the Swell reed chorus completed before the Great flue-work — 16′, 8′ and 4′ chorus reeds specified before the Great gets a mixture or goes higher than 12-15. This brings about a highly specialized organ unsuited to the correct rendition of the bulk of the classics, and almost impossible as an accompanimental instrument. It insists on going its own way and has to be handled with gloves and humored at every turn. It is indeed strange that such "sports" of correct design still spring up now and then— weird evidence of amateur misplaced confidence and wasted buyer's money.

CHAPTER 5

Another Vital Detail That Makes the Organ Useful

OF VITAL IMPORTANCE in the organ is the existence, color and variety of *mf* secondary powered flue chorus-work. Most organs have rich loud tone, but how few have rich soft tone — or rich *mezzo-forte* tone! The *mf* stops are used far oftener than the *f* or *ff*, and if the organ is to deserve the appellation of "colorful" then most decidedly *the place to put the color is where it is heard the oftenest.* There are two kinds of organ color: single-stop and chorus. We expect single voices of outstanding quality and character, but we usually look in vain in any but large organs for color in the secondary chorus-work — the very place where color is needed most.

Start with the Great of the organ you are going to examine. Of course, it will probably have some sort of primary chorus, with unison, octave, twelfth, fifteenth, mixture, and perhaps a double, but what else is there in the section? Today you usually see two 8′ stops, *rarely* three. If there is a #2 unison, there may be a #2 octave, but how often is there anything higher than that? Only in the luxury schemes is a secondary mixture specified (if there are two mixtures they both usually belong to the primary chorus). There often is a #2 unison, an 8′ flute or Gemshorn and a 4′ flute. This sort of thing, so typical, does not change the fact that it is drab, uninspired thinking. How can we get more color with *equal quantity* in this *mf* part of the Great? The one and only solution is the 4′ Quintadena, which acts like a little mixture, especially when super-coupled. This versatile register so far excels any Great 4′ Flute that anyone

who tries it will never be satisfied without it. A group consisting of #2 Diapason, 8′ Flute and 4′ Quintadena, all super-coupled, yields a delightful little *mf* chorus full of life and sparkle. Again, either the Diapason or the Flute, with the Quintadena, coupled or not, is unique and useful.

A sensible trend is to convert the customary Choir section into a Choir-Positiv. A Positiv needs a high-pitched Mixture. Our secondary Great has a substitute "Mixture" of low pitch; so, in order to fit neatly into a progression, the Swell should have a *middle-pitched* mixture. The build-up of these minor choruses begins with the Great, and proceeds to the Swell and finishes with the Positiv — a smart progression — for *unlikes add up*. There is no dis-similarity more effective than pitch difference. There is no way to *suggest* power increase as well as by adding a different pitch.

Is the Swell Mixture under consideration middle-pitched (assuming that there is but one Swell mixture), or is it a Plein-Jeu of good power and high pitch? If the latter, it is totally unrelated to and unfitted for participation in the secondary flue chorus contrast and build-up. A mistake of this sort wrecks the whole plan. The organ starts to balk. Registration, for some obscure reason, becomes difficult. The organist finds the organ unwilling and intractable. A genuine Plein-Jeu is naturally adjusted to the chorus reeds — to full Swell. That is what its name implies. It makes the Swell a one-gear affair that defies you to change it. The Swell Plein-Jeu, when the only Swell Mixture, is a study in non-cooperation. It is one of those mysterious under-the-surface influences that make the organ hard to handle. The inclusion of a true Plein-Jeu in a one-mixture Swell of a medium-sized three-manual organ is a confession of ignorance or disregard of that complete integration that can

make the organ pliable. It makes an isolationist out of what should be an internationalist.

Without organization into balanced and interlocking flue choruses, the secondary single stops of an organ are isolated islands of tone. If integrated minor flue choruses are not provided, the single stops degenerate into nothing much more than flutes and strings, with limited use and limited interest. It takes a mixture, or a reasonable facsimile, to make a chorus, and that mixture should be of proper weight and pitch to fuse the 8′ and 4′ flues into a solid sound where the components are not individually distinguishable. It is far more important that the Swell Mixture go with the flues than with the reeds. The reeds are in some ways better off for not being diluted with mixture tone; and certainly any Mixture capable of matching and extending the Swell reed chorus is too big for the Swell flue-work.

Chalk up another score against the organ with but one mixture in the Swell — and that a Plein-Jeu. Note how many times you will have to make this black mark. The seriousness of this fault is much greater than just its effect on the Swell. This vital link in the cumulative effect of *three* secondary flue choruses is thus misfitted, and the entire progression disjointed and broken. Learn to look deeper than the surface. What spoils the Swell spoils one section, but it also spoils the teamwork of *three* sections. In the light of such examination, such disconnected criticism as: "I like the diapasons," "Why does he use an open flute?", etc. stand out starkly as pitiful. An unintegrated organ is rotten at the core, and we slice the tonal apple in half with the knife of this surgical test of the interrelation of the three most useful flue units. I know nothing more important in organ appraisal than this test. It is the quickest way to a positive — or negative verdict. The organ is either. good — or bad.

CHAPTER 6

What Makes the Great "Tick"

THERE MAY COME A TIME when, in the very exploratory state now characterizing design, Great sections are specified that sacrifice dignity to amiability — that dare not increase the power of individual registers for fear of overshadowing the Pedal. But as Dr. Schweitzer has written: "Majesty is of the essence." That is why our minimum all-purpose scheme has a major diapason chorus quite dynamically more telling than the secondary work. Instruments not possessing such major effects are more than likely to be just "studio freaks" made for some special purpose or for the playing of some limited school of composition, and in the strict sense of the word are not to be rated as "organs" at all. No organ deserves the name that does not *feature* this crown of organ glory, the fully developed Great.

One of the main registers responsible for dignity and true balance is the double, the 16′ member of the flue chorus. To those who think they prefer Quintatens for the Great double, a few words out of a pamphlet by T. C. Lewis, printed in 1897, may be revealing. The word used to be: "If you want reeds, go to Willis; if you want diapasons, see Lewis." Southwark Cathedral organ and many of Lewis' lesser works stand as monuments to the artistry of this devotee of flue grandeur. No one excelled him then or now in this branch of organ building. His pamphlet reads: "I remember once building an organ in which I had a Double Diapason of spotted metal of considerable substance; also, for the sake of the contemplated comparison, a 4′ Octave *of the same scale and equal substance,* voiced exactly

like the 16′. The Octave pipes were made with the greatest proportion of tin admissable, and after carefully testing the tone of the two, a musician of considerable acuteness of ear for sound and I came to the conclusion that it was next to impossible to detect any difference; however, if one was more to be preferred to the other, it was the spotted metal."

This quotation kills two birds with one stone. It shows what perhaps the greatest master of Diapason chorus-work thought a Double ought to be, as related to the Octave member. It also lays the obstinate ghost of "pure tin for perfect tone." The average amateur is encumbered with the obsession that there is a noticeable difference and superiority in the tone of pipes made from tin, or, as Lewis wrote, "as high a percentage of tin as is admissible." I don't know why this legend stays so stubbornly alive.

The greatest audible effect tin might have over spotted metal as pipe material might amount to not more than two or three per cent — if that. The thickness of the spotted metal or tin pipe might vary two or three per cent, and more than counteract or neutralize the difference due to metallic formant. ("Formant" is taken to mean the sound of the metal itself.) We cling to these questionable and unimportant fairy tales with fervor, and ignore or deny other factors — real factors — governing timbre to enormously greater degree. We choose, *preferably*, chests that prohibit (not just inhibit) best speech and timbre, and swallow the fallacy of tin. Finally and conclusively, let us give up this fetish for tin tone. The timbre a great voicer can get from good spotted metal is good enough for the best work man can do. Frequently we see amateur specifications demanding 45% tin for some stops, 55% for others and 65% for still others. I should like to meet the man who can listen and say what percentage of tin is in which pipe.

I know that one of the smallest voicing details could be infinitesimally altered and cause more tonal difference than exists between 45% and 65% tin potentialities. The spectacle of the amateur insisting on exact tin content, while simultaneously accepting quick voicing would be amusing were it not so common and so costly.

Today the Quintaten Great Double addicts regulate the Octave as loud as, or louder than, the Unison Diapason, and regulate the Quintaten to produce not more than about 50% of the fundamental the Unison develops (the trouble with a Quintaten is that if blown harder, it yields more fifth but not more fundamental). The Lewis prescription employed a 43 scale unison and an octave not more than two notes smaller, and a double of the *same size and power as the octave* — and of the same *timbre*. In doing this, he followed his avowed master, Schulze.

The Lewis Diapason deserves a word at this juncture. Mr. Lewis wrote: "My standard of an ideal diapason tone, for a representative organ of good size, may be stated as the tone given by a cylindrical pipe called two-foot C, which is of 2-3/16″ diameter, having a mouth-width one-quarter of the circumference (1¾″) and its mouth-height ⅜ and 3/32 inches (15/32″), at the foot a wind-hole ⅜ and 1/16 inch (7/16″), the wind pressure being by gauge 3½ inches, the pitch 267½ vibrations at 60 degrees Fahrenheit, and the pipe being voiced to sound its note firmly, yet leaving it securely within the verge beyond which it might fly off to its octave. A stop worked out in scale on these lines throughout I accept as musical." In short, Mr. Lewis, by this workmanlike description, assures us he did not like, or use, quick tone. We could ask for no greater authority.

If everyone admits that reverberation takes over where the

art of the voicer leaves off, and produces a beauty of tone non-reverberation cannot compass, accomplishing this by fattening every note played by adding to its proportion of fundamental, how can anyone condone the folly of this present day fad of deleting unison and double members from chorus tone — removing the fundamental and thereby increasing the proportion of thinner tone? We cannot have things both ways. A little thought puts the weightless lopsided work we feature today in the position of some of the more absurd discarded fashions in dress, which we abandon when common sense catches up with nonsense.

I listened the other evening to a new long-playing record of the Bach "Passacaglia," played by an executant of national repute on a large organ in a magnificently reverberant church. His registration in the climaxes went something like this: no flues lower pitched than 4′; all the Mixtures in the organ; all the Trompettes at 8′ and 4′ (and what Trompettes!); this was superimposed on a Pedal that ran down to a 32′ reed topped by brilliant, higher pitched stops. This corrosive imitation of French sound and fury bordered on vulgarity. It insulted the majesty of the "Passacaglia." Yet the top-and-bottom-without-middle tinny snarl is what numbers of current organists try for, and consider ideal *fortissimo* tone. They seem to have thrown overboard the lower portion of the harmonic series and such humble objectives as nobility, dignity, suave ease and substantial majesty. They continue to bring up the subject of displacing normal Great unison diapasons with smaller stops of fractional weight and power, saying: "No 8′ Diapason that has to be added last has a rightful place in the Great."

I know of no 8′ flue louder than an ordinary *mp* (not *mf*) flute that can be added to one of their typical dazzles of 4′, 2′ and mixture tone without a "bump." By the same token, I know

of no 4′ Diapason that can be added to a shimmer of 2′ and Cymbel tone without just as much of a bump. We can travel still farther down the road to absurdity and state that no 2′ Fifteenth can be added to a 29-33-36 Mixture without another such bump.

The fact is that a great many organists of today habitually play in 4′ pitch instead of the normal 8′ in which the music is written. These people put the roof on before they erect the walls of ensemble. *The correct sequence in any surprise or climax is from normalcy to excitement* (the reverse is anticlimactic). *The correct sequence in climactic tonal build-up is from normal 8′ up, never from abnormal 4′ down.* But if the extremist lives in a world of 4′ and 2′ tone, any normality of 8′ diapason sound seems muddy and dismal. Of course, he pays no attention to the fact that his mixtures usually start with harmonics of the 8′ series. He leaves in the Twelfth and Fifteenth, but takes out the Unison! (He *must* delete the Twelfth if he leaves out the Unison.) The whole fad is ridiculous froth without a logical leg to stand on.

The only way to test a diapason chorus for balance is to *draw it all at once.* Then listen to see if the components can be heard individually. If they can, balance is wrong. In a good chorus, balance absorbs the members. But the present style of Great playing (and that is a good name for it — playing) is not concerned with chorus-work and the impressive maneuvering of organized divisions. It prefers instead the incomplete lacunae of harmonic rabble. It is not likely that a "system" that defies basic harmonic laws will long survive. Like the thick work which it displaced and from which it is a reaction, it will be shoved aside by the next generation. It is a pity that in the meantime so many young talents have to be shunted up such a cul-de-sac.

This is no argument for 8′ tone as such, but for balanced tone, balanced chorus tone. It takes chorus-work to make an ensemble, and without ensemble there can be no organ. So far as grandeur is concerned — and no one will condemn that quality — it would be better if the chorus were based on 16′ tone, or 32′ — or 64′. Extended harmonic limits are the essence of tonal grandeur. There can be no defense for arbitrarily shrinking limits already provided.

To each member of the Great flue chorus harmonic series, then, extend its due. The Great requires that it be founded on at least 8′ pitch. If the 8′s are left out of full Great, how can that division contrast with or build-up from the Swell flues, which properly accent 4′ tone? *Pitch progression dictates basic pitches of divisions.* Disregard of a section's natural pitch throws a monkey-wrench into the cogs of full organ build-up; *it indicates ignorance of the correct process!* Such a discussion as this may "date" a treatise, but it will always serve to illuminate future fads, for they are certain to spring up; they always have and they always will.

All the preceding argument has been in favor of normalcy, balance, avoidance of eccentricity or over-specialization. The general aim has been toward catholicity of purpose and performance.

In the beautifully chosen words of John Compton: "It is well to seek the inclusion of all that is best in every type of tone." The problem of achieving this in a medium-sized three-manual organ is one of condensation, compromise, protean capabilities: integration that comes in "layers" of single stops, minor choruses, sections — full ensemble.

This is the one way to progress. Smaller ideals are reactionary.

APPENDIX I

A FEW SIMPLE TESTS TO APPLY TO ANY ORGAN. THEY ARE COMPLEMENTARY TO THE USUAL ONES OF BLEND, BUILD-UP, ETC.

1. Measure room acoustics.
2. Gauge the basic timbre of Great flue-work as fitted to room acoustics.
3. Test bass-treble balance of flue chorus-work as adjusted to acoustics.
4. Find out what type of chest is used.
5. Blow by mouth 2′ C of the principal Diapason to determine if it is properly fitted to this type chest (with its individual speed of valve action).
6. Examine for the existence of secondary flue choruses on each manual (adequate upper-work for the *mf* voices).
7. Test for the progression of harmonic development of Great, Swell, Choir secondary choruses.
8. Test for the progression of basic pitch (loudest pitch) of these three secondary choruses (8′-4′-2′).
9. Compare the strength of the Swell chorus reeds with that of the Great flues.
10. Analyze the progression of *timbre* of the 16′, 8′ and 4′ Swell chorus reeds.
11. Test for any gaps in the Swell flue-reed build-up.
12. Has the Choir a major chorus reed? If so, what is its power and timbre?
13. Test the homogeneity of each division. Are any stops mis-cast?
14. Test for color differences in the 8′ and 4′ flutes, strings, etc.
15. Examine the ways in which these 8′ and 4′ voices are grouped (stopped 8′ with open 4′, etc.).
16. Try the blend and coloring ability of the mutations. Are the Nasard and Tierce as loud as the 4′ flute of the section in which they are located? They should be very close to it in power. The Nasard can be slightly stressed, and slightly firmer than the others.

17. Test for easy manual-pedal balance in polyphony. Is it provided in variety?
18. Are the major flue and reed voices developed to capacity, or are they underblown? Do their trebles "fall off"?
19. Is the Great really the GREAT? Or is it a smaller section to which the others are coupled in order to obtain balance and power?
20. Do you get the feeling of too-good blend in which no voice protrudes, for the reason that no voice is *different* enough to do so?
21. Is the final flue and reed climax from innately richer voices?

APPENDIX II

UNIFICATION (EXTENSION)

To those prospective owners of new organs who are toying with the idea of "saving a few dollars and increasing the flexibility of the scheme" by a little unification, our advice, like that of *Punch* to those contemplating matrimony is — "Don't." It does not always work out as well as you think it will, and it is full of pitfalls.

There are, of course, a few isolated situations where minimum unification is permissible (we are speaking of manual voices), but *how* few, and how cautiously and judiciously they must be approached!

Most of us imagine unification to be nothing more than provision for playing an extended set of normal pipes at more than one pitch. But unification upsets the scaling of this set for power and color balance, making it abnormal! The designers of the John Compton firm, who know more about this subject than the rest of the organ world put together, vary the scale of an 85 pipe 16′-8′-4′ reed rank two or three times between bass and treble. They avoid unifying a stop at 8′ and 4′, preferring to take the 4′ from a 16′, thus minimizing the chances of "playing the same pipe twice." This practice also simplifies power balance. I still remember a 16′-8′-4′ Compton Swell Trumpet with a synthetic mixture made from the Geigen and Octave — it had to be heard to be believed. But it was a triumph of scaling, voicing and balancing far beyond the powers of the amateur designer or the less-than-specialized builder — and it was in a very favorable church acoustically. Synthetic mixtures add more weight than brilliance. The fact that the fifth-sounding ranks are not tuned "clear" is not too fatal in the grand ensemble, though of course this procedure cannot yield first-class work. The general effect tends to be thick.

It is all right to extend a harmless Dulciana or some other minor stop down to 16′ from the 8′ stop when the rest of the section will profit from that amount of double, and it saves a little money over an independent 16′. BUT — never forget that every pipe in the extended set has its own magnet and contacts, and the chances for electrical trouble are at least doubled. Nearly always, electrical trouble in a partially unified organ will be in a unified stop. You can depend on

that. The good old simple straight-organ action — you can depend on *that,* too!

Of course, those firms using a direct magnetic action in which every pipe valve is operated by an individual magnet, find unification unusually tempting. The mechanisms are already there, so why not exploit them? But the direct magnetic action has inherent and serious faults, and reliance on more than trival unification so defeats musical results that such work can be sold only to the unsophisticated and cannot be taken seriously.

The real abuse of this magnet-to-pipe system is unification plus duplexing — by this, I mean borrowing more than one pitch on more than one manual. The country has been flooded with three-manual organs of about fifteen ranks with the Gemshorn (or equivalent) at 8′-4′-2′ on the Great and 8′-4′ on the Choir, or possibly even a derived "Nasard" also. This sort of thing is being done every day by firms who know better; with an imposing drawknob console it puts up a front that bamboozles the buyers. It looks like a lot of organ, but it is mainly knobs, magnets and switches. It is a great pleasure to speak out against this wide-spread practice.

The cost of manual unification varies with the type of mechanism used by the builder. Unification *can* be done pneumatically as well as electrically, and at low expense. But what good does it do? The several pitches all have the same timbre, are unbalanced to each other in power, and the out-of-tune off-unison derivatives would not be tolerated for an instant in any other form of ensemble. For a little more money it is usually possible to buy a better bargain in actual stops and save the integrity of the financial and musical investment.

The extension school retaliates with its condemnation of sub and super couplers in which, of course, the straight organ cannot claim color or power contrast, or balance. It states that unification is really nothing more nor less than individual stop couplers, providing far more variety as well as balance. To a certain extent, and in a sense, this is true. However, in such unified work, one always encounters the complexity of the action and the omission of real-pipe variety of timbre. Also, in order to get this claimed variety from unified work, it is neces-

sary to do it extensively. You do not get variety from borrowing on just a couple of ranks.

There is no question but that the standard musical effects can be had from a straight organ of considered design and moderate size, and that the "paper" variety obtainable through unification is not always musical. Such bizarre sounds cannot reinforce the harmonics of a family of pipes; they are not qualified for that duty. Rather, their odd ingredients produce a "muddiness" of sound. The diapason chorus should be made from diapasons, the reed chorus from reeds, etc.; if they are not, one gets a heterogeneous "dirty" tone that soils the name of ensemble.

However, I believe in unifying an 8′ Geigen on the Great from a 16′ Violone (call them Contrageigen and Geigen if you like), for one thereby gets greater variety in chorus and quality, and has another unison timbre at reduced cost. Perhaps we might stipulate that the unified stop should be "in the family" of the independent stop it augments; and this is true with both flues and reeds.

Proceed with caution. Avoid excessive use. Consult a physician. And remember that none of the great organs of the world is unified.